

iCMR

International Conference
on **Multidisciplinary**
Research 2020

“Winning Formula During a Pandemic”





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Vision

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Mission

Produce quality human
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responsibility, having innovative
thinking and analytical skills to
serve humanity

iCMR
International Conference
on **Multidisciplinary**
Research 2020

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22
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Contents

Session 01 : Building Studies

Applicability of ecological footprint to evaluate environmental sustainability in apparel sector built environments in Sri Lanka Depega Christine Jebanesan <i>School of Building Studies - British College of Applied Studies</i>	29
Implementation of e-tendering and electronic contracts in sri lankan construction projects: a special reference to public sector A. A. Dilsath <i>British college of Applied Studies, Kalmunai, Sri Lanka</i>	31
A study of building procurement process as a potential tool to enhance the safety practice in the construction industry Rajasingam Kajaneethan <i>British College of Applied Studies</i>	35
Important of Healthy Building Concept in this Present Covid-19 Situation - Case Study Eng K. Kajeenthana, H.A. Kulaliny, K. Kaveenan <i>Department of Civil Engineering, The British College of Applied Studies, Sri Lanka</i>	37
Impact of Covid-19 to the Construction Industry in Sri Lanka-Case Study on a Questionnaire Survey ¹ Eng K.Kajeenthana ² P. Thamizhiny ³ T. Jasothiny ¹ Department of Civil Engineering, The British College of Applied Studies, Sri Lanka, ² British College of Applied Studies, Jaffna Sri Lanka, ³ British College of Applied Studies, Jaffna Sri Lanka,	41
Cost overrun, in construction of building projects in Sri Lanka T. Gajavathanan <i>British College of Applied Studies</i>	45
Effect of Using Software for Measurement in Sri Lankan Construction Industry M.M.M Sufarullah, K.T.M. Kavinda Kulathunga <i>British College of Applied Studies, Kandy, Sri Lanka</i>	47

Session 02 : Computer Science

Descriptive study on the health impact of excess use of smart phone in view of digital wellbeing ¹ Abdul Majeed Fathima Infaza, ² Ahamed Rameez Mohamed Nizzad ¹ BTEC HND in Computing, Department of Computing, British College of Applied Studies ² Senior Lecturer, Department of Computing, British College of Applied Studies	51
Impacts of video games and movies in the behavior of youth: How they react to problems N.F Afra, Thilochana Rangamaarachchi <i>British College of Applied Studies, Kandy, Sri Lanka</i>	56

Study on Involvement of Selfie Captures in Current Sri Lanka Afrin Hamza, Thilochana Rangamaarachchi <i>British College of Applied Studies, Kandy, Sri Lanka</i>	64
A brief note on green cloud computing Ahamed Rameez Mohamed Nizzad <i>Post graduate, Faculty of Graduate Studies and Research, SLIIT</i>	74
Impact of Computer Technology on Health: Assessing the Risk Factors for Computer Vision Syndrome Among Computer Users G. Arunath, Mrs.Thilochana Rangamaarachchi, D. Keshara <i>British College of Applied Studies, Kandy, Sri Lanka</i>	77
Health effects of cellphone radiation on human brain Dhackchila Nadeshan, Thilochana Rangamaarachchi <i>British College of Applied Studies, Kandy, Sri Lanka</i>	84
Machine Learning Approach to Support Cinnamon and Lucky Bamboo Cultivation in Sri Lanka Dissanayaka D.D.N., Y.H.Gunasekara, Rathnayaka R.M.P.D., Gurusinghe D.V.S. and Vithana.N	95
“SMART FARMER” Mobile application for agricultural based logistic management and consultant service H.S. Thathsarani , R.S. Gamalathge , N.A. Gunawardhana, W.M.A. Damayanthi, Dr. Nipunika Vithana <i>Sri Lanka Institute of Information Technology</i>	101
“RIYA PASALA”: Driving license voice based examination application for illiterate people Isanka Abeysekara, Ravinda Wijethilake, Jithmi Thulsika, Thewaki Ambalawanan, V. N. Vithana <i>Department of Information Technology, Sri Lanka Institute of Information Technology</i>	111
Profile of Cyber Criminal Kodippili K.A.S.G <i>Faculty of Information Technology, University of Moratuwa</i>	119
Use of IoT with Smart College System M.G.H.C. Dissanayake <i>Faculty of information technology, University of Moratuwa</i>	134
A systematic review on modern recruitment strategies: A qualitative study Main Author : Ramakrishnan Vivek <i>Visting lecturer at Open University Sri Lanka</i> Co Author : Dr.Y. Nanthagopan, <i>Dean, Faculty of Business Studies, Vavuniya Campus</i>	147
A study on involvement of children in video games M.F.F Rishadha, Thilochana Rangamaarachchi <i>British College of Applied Studies, Kandy, Sri Lanka</i>	167

Contents

This Is the Most Effectiveness System for all patients and physicians. (Pharmacy Buddy System) T. D. Gunawardana <i>Sri Lanka Institute of Information Technology, Colombo, Sri Lanka</i>	172
--	------------

Session 03 : Engineering

A mathematical model to determining the quantities required for the estimation of labour work in the construction industry Fawas Abdul Latheef, Chathura Vidanapathirana <i>Department of Civil Engineering, British College of Applied Studies, Mount Lavinia, Sri Lanka Affiliated to University of East London, United Kingdom</i>	179
An approach to evaluating the performance of highway infrastructure under peak traffic conditions using microsimulation Hassan Hazif Shakir, Chathura Vidanapathirana <i>Department of Civil Engineering, British College of Applied Studies, Mount Lavinia, Sri Lanka Affiliated to University of East London, United Kingdom</i>	183
Offering engineering education with standards during the time of pandemic in Sri Lanka JM. IHSAN <i>British College of Applied Studies</i>	186
Discover the Optimisation Method to Reduce the Geometry of the Slab and Beam by Using Novel Material Techniques in The Building Structure ¹ Kajeenthana Kamalaseelan ² Satheeskumar Navaratnam ¹ <i>Department of Civil Engineering - The British College of Applied Studies, Sri Lanka,</i> ² <i>Department of Infrastructure Engineering - The University of Melbourne, Melbourne, Australia</i>	190
Thermal performance of old traditional buildings in Sri Lanka Kajeenthana Kamalaseelan <i>Department of Civil Engineering - The British College of Applied Studies, Sri Lanka</i>	195
Recent Advancement And Challenges On Visible Light Communications M. Suganja (Amie), S. Jeyaram <i>Sri Lanka Technological Campus</i>	199
Development of an analysis technique to study the effectiveness of green barriers Rusaith Kalenther, Chathura Vidanapathirana <i>Department of Civil Engineering, British College of Applied Studies, Mount Lavinia, Sri Lanka Affiliated to University of East London, United Kingdom</i>	204
Impact of polarization hole burning in optical submarine systems S. Jeyaram & M. Suganja <i>Sri Lanka Technological Campus</i>	208

Session 04 : Languages

Online Teaching to the Rescue: Teaching English during the COVID Pandemic to Students Aged 15-18 Online in an Urban Sri Lankan context Chathuri Alwis	211
Effect of Modern Technology for Bilingual Students During the Covid-19 Pandemic Situation Krishna Weerathunga Ekanayake	214
English Language Proficiency of the Bilingual Teachers of Sri Lankan Government Schools in Colombo District Krishna Weerathunga Ekanayake	218

Session 05 : Health Sciences

"Impact of covid 19 lockdown on mental health and well being" M.F. Ashik Ahmed, WSM Fernando <i>Department of Biomedical Science, British College of Applied Studies, Colombo 6</i>	220
Identification of social and occupational risk factors associated with CKDu patients in an agricultural community in Kebithigollewa, Sri Lanka Chamodika Lowe ¹ , Dr. Nishantha Kumarasinghe ² , Fahim Aslam ³ <i>Department of Biomedical Science and Physiology, University of Wolverhampton¹, Wolverhampton, UK</i> <i>Department of Anatomy, Faculty of Medicine, General Sir John Kotelawala Defence University², Rathmalana, Sri Lanka</i> <i>Institute of Ayurveda and Alternative Medicine, Panadura², Sri Lanka</i>	225
Development of a real time reverse transcriptase PCR assay to detect dengue virus serotype 1 ¹ Harini Hokandara Acharige, ² Yoshitha Wahalathanthri, <i>¹Department of Biomedical Science and Physiology, University of Wolverhampton, Wolverhampton, UK.</i> <i>¹Department of Biomedical Science and Physiology, British College of Applied Studies, Colombo 06, Sri Lanka.</i> <i>²GENETECH Molecular Diagnostics, Colombo, Sri Lanka.</i>	229
Development of real-time PCR assay to detect bk virus ¹ Nerthiga Kandasamy, ² Lakvin Fernando <i>¹Department of Biomedical Science and Physiology, University of Wolverhampton, Wolverhampton, UK</i> <i>¹Department of Biomedical Science and Physiology, British College of Applied Studies, Colombo 06</i> <i>²GENETECH Molecular Diagnostics, Colombo, Sri Lanka</i>	234
Potential for foodborne transmission of respiratory syndrome coronavirus 2 (sars-cov-2): a mini review Pabasara Weeraratne <i>Department of Animal and Food Sciences, Oklahoma State University, OK, USA</i>	243

Contents

Optimization of inclusion of primers for an internal control in the reverse transcriptase polymerase chain reaction (RT-PCR) test in detection of BCR-ABL p210 translocation ¹ Salaru Prathibha Diyunugala, ² Vajirapani De Silva ¹ Department of Biomedical Science and Physiology, University of Wolverhampton, Wolverhampton, UK. ¹ Department of Biomedical Science and Physiology, British College of Applied Studies, Colombo 06, Sri Lanka. ² Genetech Molecular Diagnostics and School Gene Technology Colombo, Sri Lanka.	248
Analyzing CKDu Patient's Quality of Life Using Speech Recognition Method; A preliminary Study Tharindu Manoj ¹ , D.N. Lokuarachchi ² , Dharshana Kasthurirathne ³ , Nishantha Kumarasinghe ⁴ and Fahim Aslam ⁵ ^{1,2,3} Faculty of Computing, Sri Lanka Institute of Information Technology, Sri Lanka ⁴ Department of Anatomy, Faculty of Medicine, General Sir John Kotelawala Defence University ⁵ Institute of Ayurveda and Alternative Medicine	254
Session 06 : Legal Studies	
A study on the impact of ragging on psychological well being among peradeniya university students F. Afrah Salman British College of Applied Studies, Kandy Campus – Department of Legal Studies	259
The rule of law in Sri Lanka; A critical analysis Izrath Mohamed British College of Applied Studies, Kandy Campus - Department of Legal Studies	262
Effects of physical punishments against the child right laws in Sri Lanka (Nuwara-eliya) K. Abirami	265
An indepth analysis on necessary law reforms to Safeguard educational rights of children living in slums in Sri Lanka Maheesha D. Jayasuriya British College of Applied Studies, Kandy Campus - Department of Legal Studies	270
A unified legal system for a diverse community: A critical analysis N.N. David, H.H.F. Salamath, B.M. Basri, R. Shaiprasad, W.L Nethmi De Alwis Gunathilaka British College of Applied Studies, Colombo, Sri Lanka	275
Prisoners right to be free from torture: A critical analysis Parthiban Durgayini British College of Applied Studies, Kandy Campus - Department of Legal Studies	278
A study on the importance of community awareness to strengthen the self esteem of the HIV patients through eliminating discrimination R.Shaiprasad, N.N.David & A.L.A.B.Kaumadi	282

Lessons from ebola to fight corona virus R. Shaiprasad, N.N. David & A.L.A.B. Kaumadi <i>British College of Applied Studies, Colombo, Sri Lanka</i>	285
A systematic review on modern recruitment strategies: A qualitative study R. Vivek ¹ and Y. Nanthagopan ² ¹ <i>University of Colombo, Sri Lanka</i> ² <i>Faculty of Business Studies, Vavuniya Campus of University of Jaffna, Sri Lanka</i>	289
Strategically Learning from Covid 19: Public universities Sri Lanka Ramakrishnan Vivek and Y.Nanthagopan	292
History of the reforms of sri lanka leading upto the Independence in 1948 Sarah De Alwis <i>British College of Applied Studies, Colombo 6, Sri Lanka</i>	297
Theoretical politics and applied politics: A comparison Study Sarah De Alwis <i>British School of Applied Studies, Colombo, Sri Lanka</i>	301
A study on political socialization Sarah De Alwis <i>British College of Applied Studies, Colombo 6, Sri Lanka</i>	305
Caste system - a threat to equality in the plantation sector in the Nuwara Eliya district Vishani Jayakanth <i>British College for Applied Studies, Kandy Campus - Department of Legal Studies</i>	310

Session 07 : Management

Human Resource Strategies to Manage Workforce Diversity Performance on Automobile Industry in Sri Lanka A. Fathima Nuskiya ¹ A.N. Zeezan Seznée ² ¹ <i>Lecturer in Business Management, British College of Applied Studies</i> ² <i>Student of Business Management, British College of Applied Studies</i>	315
Identifying Challenges in Workforce Diversity in Sri lanka Aliyar Fathima Nuskiya ¹ Rizofer Minhaj ² <i>Business Management, British college of Applied Studies</i>	318
Impact of hertzberg motivation factors on employee performance D. Yanushka <i>British College of Applied Studies, Colombo, Sri Lanka</i>	322
Effect of Workforce Diversity on Employee Performance Himantha Shehan <i>British College of Applied Studies</i>	325

Contents

Current issues of equality and diversity in the work place and how management respond to these issues Jeramin Radesh Hillary <i>British College of Applied Studies</i>	328
Issues and challenges on equality and diversity arising on workplace and the management Kumaravel Dhanusha, Keshani Weerasinghe <i>British College of Applied Studies</i>	331
Impact of social media information characteristics on social media Mohammed Akash Noufer <i>British College of Applied Studies, Mount Lavinia, Sri Lanka</i>	334
Impact of workplace motivation, environment and leadership behavior on employee psychological capital Muhammed Nizamdeen <i>British College of Applied Studies, Colombo, Sri Lanka</i>	337
Impacts of Global Warming Nahshon De Alwis and Sarah De Alwis <i>British College of Applied Studies, Colombo, Sri Lanka</i>	340
“Why employees are fearful of speaking up towards their leaders”? Evidences from National Water Supply and Drainage Board Sachin Shivange Wijetunge <i>British College of Applied Studies, Colombo, Sri Lanka</i>	342
Talent management process in an organization Sahayam Pillai Manushika <i>British College of Applied Studies</i>	345
Talent management process in an organization Sangeeth Sathsara Nanayakkara <i>British College of Applied Studies Kandy</i>	348
Effect of Workforce Diversity on Employee Performance Zainab Fareed and Safra Saley <i>British College of Applied Studies</i>	351

Session 08 : Multidisciplinary

An Exploratory Analysis on Multi-Decadal Forest-Cover Dynamics in the Dry Zone of Sri Lanka: Patterns and Drivers of Forest-Cover Changes with Insights for Environmental Policy Reforms

Manjula Ranagalage^{1,2}, M.H.J.P. Gunarathna³, Thilina D. Surasinghe⁴, D.M.S.L.B. Dissanayake², Matamyo Simwanda⁵, Yuji Murayama¹, Takehiro Morimoto¹, Darius Phiri⁵, Vincent R. Nyirenda⁶, K.T. Premakantha⁷ And Anura Sathurusinghe⁷

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355

Study of Selected Water Quality Parameters and the Cohabiting Fish Species in Sri Jayewardenepura Canal System\

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358

Man and Music: Through the Ages

Sarah De Alwis and Nahshon De Alwis

British College of Applied Studies Campus, Colombo, Sri Lanka

364

Assessment Of Groundwater Hydro-Geochemical Facies Using Graphical Tools In Girandurukotte Area, Sri Lanka

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367

Geochemical Classification of Groundwater of Auradhapura Area: Case Study Medawachchiya and Huruluwewa Area

Senanayake, S A M A I K¹., Piyasiri, S²., Nandalal, K D W³., Chandrajith, R L R⁴., Ranatunga, R R M K P⁵

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Department of Geology, University of Peradeniya⁴.

371

First Record of Lamperts' Sea Cucumber (Synaptula Lamperti) in Northern Coast, Sri Lanka

Herath H M T B¹, Hewage H H P², Nirooparaj B³, Senanayake S A M A I K⁴

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University of Sri Jayewardenepura⁴

375

BCAS CAMPUS

Established in 1999, British College of Applied Studies (popularly known as BCAS Campus) has rapidly grown into a leading educational provider in Sri Lanka with a large number of students more than 3,500. BCAS Campus has strong international collaboration, especially University of East London(UK), Southampton Solent University (UK), Oxford Brookes University (UK) and Pearson (Edexcel) UK.

Besides two main campuses in Colombo (City Campus) and Mount Lavinia (Mount Campus) in the Western Province, BCAS Campus has branches in other cities in Sri Lanka, namely, Kandy, Jaffna and Kalmunai.

Having won 17 awards nationally & internationally, the institution is highly esteemed for its exceptional quality, international recognition and market relevant training. To top it all, BCAS Campus was selected as the First of the Five Top higher education providers in Sri Lanka in 2013 by an independent survey conducted by an organization hired by Sri Lanka's pioneering business magazine LMD. Currently more than 3,500 students follow their chosen courses of study at BCAS Campus - Quantity Surveying, IT, Law, Business Management, Civil Engineering and Biomedical Science, Software Engineering, Cyber Security, Accounting & Finance, Tourism and Hospitality management Project Management etc . These courses are delivered at various level including HND, Degree as well as at Masters.

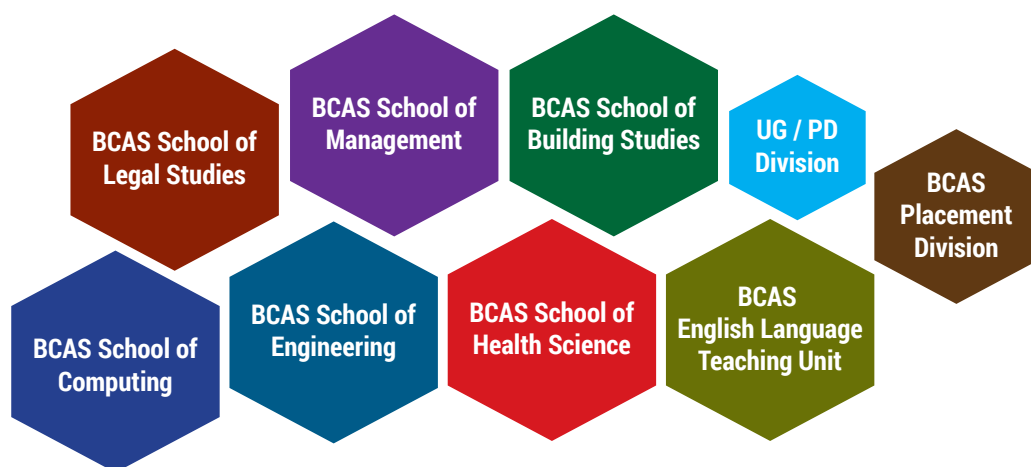
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BCAS in Brief

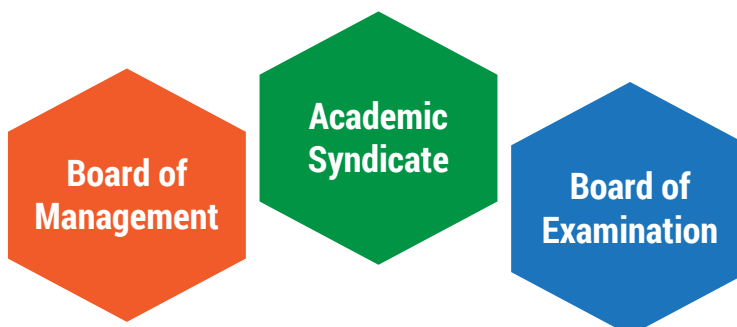
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2000	• BCAS Placement division, placed the 1st batch of students to UK institutions.
2001	• Established 1st BCAS Centre in Colombo
2002	• Setup the main branch in Colombo • Launched BTEC HND in IT/Computing
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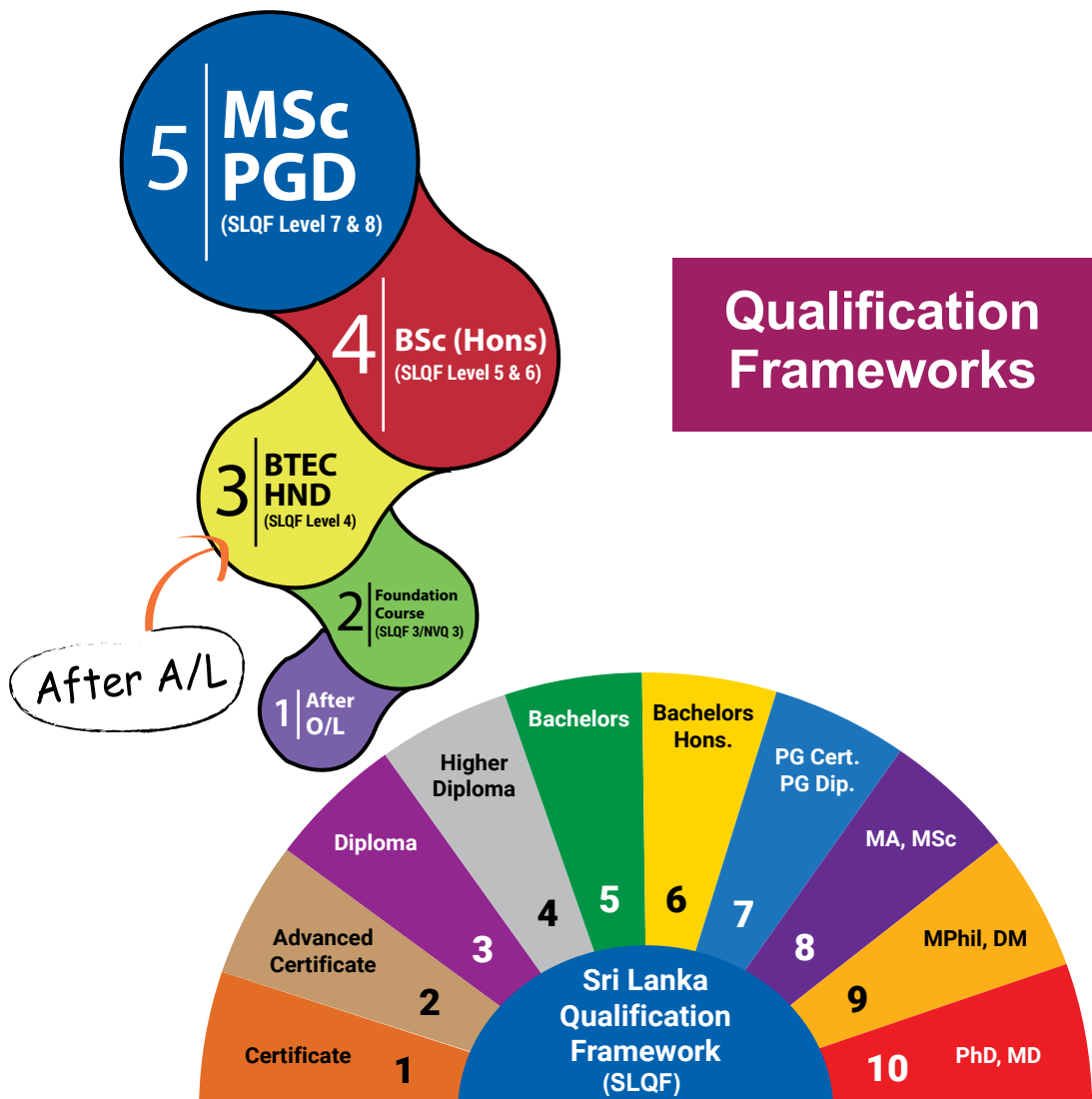
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2020	<ul style="list-style-type: none"> • Partnership with Oxford Brookes University in UK • Launched Top-up Degrees in Jaffna

Divisions / Academic Schools



Quality Management Structure





Sri Lankan National			BTEC/UK	
	SLQF	NVQ -	BTEC-QCF (UK)	
Doctorial Degree, MD	SLQL-10		QCF-L8	PhD/DPhil
M.Phil., Masters (Research)	SLQL-9		QCF-L7	Master's degrees
Master (Taught + Research)	SLQL-8			
Master (Taught), PG-D, PG-C	SLQL-7		QCF-L6	Bachelor's degrees, eg BA, BSc
Honours Bachelor	SLQL-6			
Bachelor Degree	SLQL-5	NVQ-7	QCF-L5	BTEC HNDs (Higher National Diplomas)
High Diploma	SLQL-4	NVQ-6	QCF-L4	BTEC HNCs (Higher National Certificates)
Diploma	SLQL-3	NVQ-5	QCF-L3	BTEC National Diploma
Advanced Certificate	SLQL-2	NVQ-4		BTEC National Extended Diploma
Certificate	SLQL-1	NVQ-2, 3		

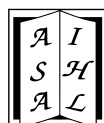
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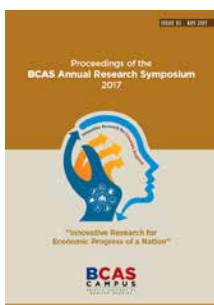
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2016 RELEASE



2017 RELEASE



2018 RELEASE



2019 RELEASE

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results based training
Asia Pacific HRM Congress

2019



> Best Employer Brand Award
> Outstanding Contribution
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> Award for Excellence in Training
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2018



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2016



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Higher Education
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2014



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2013



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2011



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2010



Message from **New Partnership University** (Oxford Brookes University)

"I am always delighted to see Oxford Brookes partners involving themselves in research and enabling improvements to the wider societies in which they are located. This is also a key priority for Oxford Brookes University, alongside the programmes we deliver with BCAS, and there has never been a more crucial time for educational institutions to be involved in research and knowledge exchange activity aimed at improving the future. For this reason, I am very happy to support the BCAS International Research Symposium 2020 and I hope it will be a great success"

Professor Linda King

*PVC Research and Global Partnerships,
Oxford Brookes University*





Message from **The Conference Chair**

Professor Swarna Piyasiri,
Dean Academic Affairs, BCAS

It is a great pleasure to send this message for the International Conference on Multidisciplinary Research 2020 (ICMR 2020) with the theme of “Winning Formula during a Pandemic” which will be an important professional event organized in 2020 by the British College of Applied Studies (BCAS), Sri Lanka.

The main objective of this conference is to bring local and international researchers of diverse disciplines to a common platform. That will provide a forum to exchange research findings & technologies among professionals, academics and researchers in different research areas. To achieve this goal, postgraduate students, researchers and professionals were invited from the universities, professional bodies, and from various research institutes locally and internationally.

ICMR 2020 will help to facilitate and strengthen personal and professional contacts among professionals, academics and researchers specialized in different areas and encourage regional and international communication amongst them.

ICMR 2020, invited research papers on different themes namely; Building studies, Computer science, Engineering studies, legal studies, management, Health sciences, Languages and multidisciplinary studies. The extended abstracts submitted by the authors on these themes were screened through a review panel and the abstracts with required standards decided by the double blind peer review process are included in the conference book.

I greatly appreciate the team effort extended by all the members of the conference organizing committee, all the sub committees, the review panel, the editorial board members, the support extended by the academic and nonacademic staff of the BCAS who helped me to bring this event to a reality.

Particularly due to the Covid pandemic situation of the country, the IT Team who managed to convert the physical conference to a virtual conference within a very short period is greatly appreciated.

Professor (Emeritus) Swarna Piyasiri

PhD (Vienna), BSc (Hons) Peradeniya, FI Biol (Sri Lanka)
*Dean, Academic Affairs,
British College of Applied Studies (BCAS)
Sri Lanka*



Speech by **The Chief Guest**

Role of universities in the 21st in the century
by Professor Ranjith Senaratne

Traditionally teaching and research had been the main functions of a university. This has gradually changed with the emergence of disciplines such as biotechnology, information technology and materials science, increased globalization, reduced state funding for universities, increased private sector support for research and new perspectives on the role of university in the system of knowledge production. As knowledge becomes an increasingly important part of innovation the university as a knowledge-producing and disseminating institution plays a pivotal role in industrial innovation. Thus in a knowledge-based economy, the university becomes a key element of the innovation system as a provider of intellectual capital, fountainhead of innovation and a seed-bed of new enterprises. In addition, it provides the backbone, from laboratories to libraries to computer networks, of a knowledge-based economy. Thus universities in many parts of the world have become wealth creators and locomotives of regional/national development. For instance, the revenue generated by the spin-off and start-up companies launched by MIT in USA is equivalent to the GDP of South Korea.

Need for a vibrant research culture

In the past, development was mainly investment-driven, and was achieved principally through value addition. Singapore is a case in point, endowed with a productive and disciplined labour force, economic stability, excellent infrastructure and effective global connectivity. Therefore she could attract technology-intensive and capital-intensive investments from multi-national companies (MNCs) such as Sony, National, Siemens and Toyota. They added value by turning those technologies into quality products and services and delivered them to the regional and global markets in a cost-effective manner. In other words, they imported global technologies and leveraged on global markets of the MNCs. Thus they borrowed technology as well markets, and it was a win-win situation for Singapore and the MNCs. Then countries like Thailand, Indonesia, Malaysia and Vietnam followed suit. Now the times have changed, and such an approach is no longer viable. Therefore it has become imperative to shift from borrowing technology and markets to creating technology and markets, and from adding to creating value. Today, the development is, therefore, innovation-driven, and it is mainly through value creation. As Lim Swee Say, former Minister of Communication and Information Technology in Singapore once said, we need to change our mindset and create new technologies and new markets in order to remain competitive in a globalized environment characterized by a rapidly changing.

technological landscape and sophisticated and dynamic markets. In such circumstances, knocking at others' doors will be futile and counter-productive. Instead of importing theories and transplanting concepts, we need to work out our own solutions. We need

to find home-grown answers and home-spun solutions to our local issues as Dr. Abdul Kalam said. Therefore in the 21st century, it is of utmost importance that we build our own intellectual assets and /capital and create our own technology and markets.

This will demand upstream scientific and technological discoveries through cutting-edge research and leading-edge technologies, mid-stream development of innovative products, processes, applications and services and down-stream effective commercialization of these discoveries and innovations in the regional and international markets. As technology has become the prime mover of development, it needs to be emphasized that university academics must continue and enhance their cutting-edge research relating to high priority national concerns and issues. As universities account for over 60% of the R&D personnel in the country, creating a vibrant research culture in universities and making them crucibles of R&D in the country is a sine qua non for the economic development of Sri Lanka.

Blending hard sciences with soft sciences: Experience of Sheffield Hallam University, UK

Until 2003, the undergraduate as well as postgraduate teaching and research at the Sheffield Hallam University were managed by eleven different schools. These schools operated very much in their own silos, and opportunities for collaboration were limited. The University took a bold decision to re-structure itself in response to the changing higher-education landscape in the UK whereby they merged four different schools, namely Engineering, Computing & Management Sciences, Sciences and Cultural Studies, to create a Faculty of Arts, Computing, Engineering and Sciences. According to Professor Terrence Perera of this university, the Sheffield Hallam University is the first university in the UK to bring Technology and Arts disciplines under one roof, creating a multidisciplinary learning environment. This involved co-locating the academic and support staff and the facilities on the City Campus, sharing lecture halls, workshops, studios etc. by the students as well as by the staff from a multitude of disciplines.

For example, Product Design students and Engineering students share the same workshop, says Professor Perera. Such interactions across the disciplines have led to several new developments. Moreover, the academics from Media Arts and Computing work together to diversify courses in the area of game design and development, and Engineers and Product Designers work in concert to improve the performance and aesthetic aspects of Racing Cars. Coming under one roof also brought researchers from different disciplines together to develop exciting multidisciplinary research programmes. The joint work of the staff of two research institutes, namely Culture, Communication & Computing Research Institute (C3RI) and Materials & Engineering Research Institute (MERI) has attracted considerable funding for a multidisciplinary research programme on "Engineering for Life". Among the many multidisciplinary research projects launched under this programme, the Arty Science Sporty Art (ASSA) initiative, a cross faculty project, uses sports as a gateway into art as well as science, affording fresh and innovative insights into sports, science, and the arts. In 2010, a unique collaboration between engineering and fashion design students explored the possibilities of using alternative materials for clothing. They combined forces to create a wedding dress that could be dissolved after the wedding to transform it into five new fashion pieces, he added.

Creating a sustainable multidisciplinary academic environment is a challenging task. However, sharing of the workplaces and the co-location of the staff will lead to collision, shaping and cross-fertilization of ideas giving birth to innovations. Steve Jobs once said “Part of what made the Macintosh great were the people working on it, mere musicians, and poets, and artists, and zoologists, and historians who also happened to be the best computer scientists in the world”. This underscores the need and value of working in a multidisciplinary team to produce innovation. Therefore universities ought to develop appropriate multidisciplinary degree programmes in order to produce creative and innovative graduates.

Need for multidisciplinary degree programmes

Since 1998, there has been ascendancy in the value of the concept and practice of interdisciplinary research and teaching and a growth in the number of bachelors' degrees awarded at U.S. universities classified as multi- or inter-disciplinary studies. The number of interdisciplinary bachelors' degrees awarded annually rose from 7,000 in 1973 to 30,000 a year by 2005 according to data from the National Center of Educational Statistics (NECS). In addition, educational leaders from the Boyer Commission to Carnegie's President Vartan Gregorian to Alan Leshner, CEO of the American Association for the Advancement of Science have advocated interdisciplinary rather than uni-disciplinary approaches to problem solving in the 21st Century.

In a relatively stable society, a graduate can be employed in a lifetime vocation in keeping with his discipline of specialization. However in a highly dynamic employment landscape, uni-disciplinary graduates may encounter difficulties in re-employment or re-skilling. Thus multidisciplinary modular undergraduate (MDM) degree developed in the USA has become the norm in the UK and has become well-adapted to the needs of changing societies. Such modular degree programmes are associated with a very “open” and flexible degree structure, allowing the accumulation of credits towards a degree over a flexible timescale, and transfer of these credits between institutions.

Therefore at undergraduate level, producing “a Jack of All Trades, Master of None” is desirable, as such graduates can reasonably compete in a number of fields, but outstanding in none of them. Multidisciplinary programmes (breadth) have the following advantages over the uni-disciplinary programmes (depth).

- Produces more versatile graduates with multiple competencies.
- Enhances students' cognitive aptitude across a wide range of disciplines.
- Brings multiple disciplinary perspectives to bear on real-world issues.
- Affords more effective solutions to complex and global issues.
- Makes degree programmes more exciting and engaging.
- Facilitates development of important skills and broadens horizons.

Low academic attainment, low intellectual rigour, reduced level of expertise, reduced systematic coherence of the degree, difficulty in securing research grant and publishing research papers are, however, some of the major disadvantages of multi-disciplinary degree programmes.

It should, nevertheless, be stressed that multidisciplinary and interdisciplinarity are entirely indebted to those who specialize in one field of study - that is without

specialists, multidisciplinarians and interdisciplinarians would have no information and no leading experts to consult. On the other hand, when interdisciplinary research results in new solutions to problems, much information is fed back to the various disciplines involved. Therefore both uni-disciplinarians and multi-disciplinarians should be seen in complementary relation to one another.

Designing of multidisciplinary degree programmes

Multidisciplinary degree programmes are designed so that students get a solid foundation in the major/s chosen. In addition, they have a good variety of courses for electives that allow them to pursue their particular interests and better prepare for particular fields of specialization. This affords students a certain degree of latitude to “design their own degree” in consultation with the Course Advisor/Career Counsellor within certain limits. The Course Unit System allows students to select and combine electives in keeping with their interests and talents. However, before consulting the Career Counsellor, it will be useful for a student to be clear about his/her interests, plans and ambitions so that the Counsellor can advise on courses based on the relevant criteria and guidelines. Neuroscience, Development Studies, Human Development, Sustainable Development, Bioinformatics, Environmental Science, Forensic Science, Nanotechnology, and Public Health, are a few examples of multidisciplinary programmes. For instance, Neuroscience, an interdisciplinary study of the nervous system, encompasses diverse disciplines such as psychology, pathology, molecular biology and even computer science along with neurology. In order to ensure a steady progress in our holistic understanding of the nervous system, such an interdisciplinary approach is an imperative. New fields such as neuroscience are now referred to as “interdisciplines”

Towards borderless multi-disciplinary universities

With modularization of the syllabi and synchronization of the academic calendar and the introduction of the Course Unit System, it is possible for students to select modules from other Faculties in keeping with their interests, talents and aspirations. This will help to produce more rounded and grounded graduates improving their marketability. However, compartmentalization and fragmentation of the higher education institutions along disciplinary, departmental and faculty boundaries pose a hindrance to the creation of such a multidisciplinary culture. Today we live in era where we need to bring down walls and build bridges. Therefore, we need to make the disciplinary and faculty boundaries more porous and permeable so that there could be free diffusion and movement of ideas, talents and resources (both physical and human including staff and students) across disciplinary/faculty boundaries. This will pave the way for borderless multidisciplinary Universities.

In addition, we need to make lecture halls, computer units, language laboratories, auditoria, cafeteria etc. as central facilities as far as practicable so that they would be shared by students from different Faculties. This will enable mixing and blending of students from different backgrounds leading to crosspollination of ideas, thoughts and perspectives giving rise to a new academic order and vigour in Universities. Besides, it would lead to rationalization of resources resulting in higher resource utilization efficiency. At present, the compartmentalization of human and physical resources along disciplinary, departmental and faculty lines has led to low resource utilization efficiency, and consequently, a high cost of production of graduates. Besides, because of this

compartmentalized thinking, whenever a proposal is submitted to commence a new degree programme or course, it is accompanied by a request for a new building.

Thus there exists considerable scope for increasing student intake, commencement of new degree programmes and reducing cost of producing graduates through rationalization and sharing of resources. For instance, a university in the USA with an effective floor area comparable to that of the University of Peradeniya has a student strength, 2 to 4 times that of the latter. This was highlighted by Prof. R.P. Gunawardane, former Secretary of Ministry of Education in Higher Education some time ago. This situation is generally applicable to all higher educational institutions in our country. Creating multi-disciplinary, borderless universities will help remedy the disturbingly low resource use efficiency and cut down unnecessary expenditures and wastages. Therefore introduction of multi-disciplinary programmes in addition to improving employability of graduates, will contribute to greater resource utilization and reduced cost of producing graduates. This aspect should be borne in mind in planning, re-organization and re-structuring of HEIs in future.

They say institutions languish, when their lovers are uncritical and the critics are unloving. We need critical lovers and loving critics. We need to recognise that relatively speaking, the Arts students are getting a raw deal in school as well as at university compared to their fellow students in Science and allied fields. They face a greater competition to enter university than their fellow students in Science. Having entered the university, they get relatively poor facilities, are exposed to lectures mainly in Swabasha by not very highly qualified teachers and follow outmoded degree programmes. Thus they are “underprivileged” compared to students in the Science stream who face relatively less competition to enter university, but get a much better deal on entry. This poses serious socio-economic and socio-political issues going beyond the question of unemployment of Arts graduates and attendant issues with far-reaching implications on cultural and social fabric of the country.

Relevance of Humanities and Social Science in building a robust social and cultural fabric

Great thinkers, philosophers and founders of faith such as Socrates, Plato, Aristotle, Confucius, Buddha, Jesus Christ and Prophet Muhammad laid the foundations for a robust social and cultural fabric some 1500 to 2500 years ago. This has set forth basic values and human ideals such as compassion, empathy, mutual respect, equality etc. fostering societies and civilizations. As described by Prof. Choon Fong Shih, former President of the National University of Singapore in his paper “The University’s Functional and Civilizing Mission in a Crowded, Culturally Complex World” (2007), technological innovations in the Industrial and Information Ages followed by material wellbeing have led to divergence between technological innovation and socio-cultural evolution. This has given rise to increasing frequency and intensity of conflict, turmoil, violence and chaos the world over. Technological advances, though have yielded material wellbeing, they have not contributed to the development of whole person – body, mind, heart and soul. Therefore we need to go beyond Science & Technology to address socio-cultural issues on this over-populated, culturally complex planet. Humanities and Social Sciences have a humanizing and civilizing influence on man and promote “Heartware”. Therefore just as much as Hard Sciences (Natural, Physical and Computing), Soft Sciences (Sociology,

Anthropology, Psychology, Political Science etc.) are also important for prosperity and peace in the world.

It is hoped that this article will stimulate thinking and debate on the “Role of Humanities and Social Sciences” in a wider context going beyond the realm of the university in restoring the social fabric, which has been torn asunder by the erosion of moral values and human ideals and the pursuit of material wellbeing of man without a matching improvement in his Heart and Mind.

I must add that the ideas expressed herein are purely those of the author and that they neither reflect the views of the UGC nor its stand in regard to the subject at issue. The author would appreciate the comments and observations of readers on this subject.

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Speech by
The Keynote Speaker
 Winning Formula during a Pandemic
 by Dr Kokila Konasinghe

“Arogya paramalaba”, this Buddhist saying has always been a part and parcel of the daily life of a Buddhist, which essentially means health is the ultimate wealth. This has never rung truer than in the current context of the Co-Vid 19 induced pandemic that spread across Wuhan, China and then across the entire world, since the latter part of 2019. While developing the wealth of health during a pandemic sounds unrealistic, the unyielding nature of human spirit is sure to find a winning formula to survive this new challenge.

In such a context, it is my privilege and honour to deliver the keynote speech at this prestigious event of “International Conference on Multidisciplinary Research 2021”, organised by the British College of Applied Studies. The theme of this conference undoubtedly molded my speech. “Winning formula during a pandemic” I take the liberty of adding few ideas to this main theme. I ask few questions from those who are in search for the winning formula during a pandemic. Here are my questions for exploration: What are you aiming to win? What is the formula you are aiming to create? (Scientific, information technology, medical, management, philosophical or artistic?) What should be your focus during a pandemic? (Physical : health, medical, science, IT, Psychological: mental health, spiritual wellbeing, spiritual development, Social: reconciliation, social harmony, domestic violence, child rights, Economic: collapse of economy, Gross national product, development indexes, legal: quarantine regulations, environmental pollution, domestic violence, child rights. I wish to address necessary elements from different subject disciplines and dimension of the pandemic issue. Finally, I will attempt to find the correct formula through multidisciplinary approach in addressing various problems. What are you aiming to win?

The first would be winning a healthy life. Scientists all around the world conduct experiments to invent a corona vaccine. Economists research how to maintain economic indexes balance during the era of pandemic. The Co-Vid 19 pandemic caught the entire world off-guard, unprepared, and hence the international community and domestic agencies are dealing with uncharted territory. Hence, there is many trial and error type scenarios in health, governance, and other spheres of public life, that we have developed to be organised, resilient and stable. I see two things that the world ought to seek to win in this situation. Firstly, to develop a system that can cope with the unpredictability and chaos unleashed by the pandemic. Secondly, to develop the ongoing coping mechanisms that different countries and communities have developed to

face the challenges presented by the pandemic (ex: working from home for employment, development of strong immunity in health care, additional attention drawn to medical research, additional resources into researching similar future threats, reorganisation of priorities, development of psychological and physical wellbeing during the quarantine lockdown, online schooling system in education sector).

What is the formula you are aiming to create?

It is evident that the world is heading towards a decade that is completely different from the one that was planned. The international agreements and action plans such as the Sustainable Development Goals adopted by UNDP, Paris Agreement adopted in 2015, can play a valuable role in determining the future action plan to face the new decade. However, these plans as they stand would not be sufficient to address the problems caused by the pandemic. Therefore, it is evident that in the international level and in the national/domestic levels there needs to be a reorganization of the priorities in terms of the policies. This changing of priorities in policies is first and foremost needed in research and development. As we have evidenced in the last few months, research dedicated to issues surrounding the pandemic has multiplied while resources are being dedicated around the globe to research the root cause, nature of the virus, vaccines and potential future issues connected to the virus. There is also a growth in 'multidisciplinary research', especially in line with the sustainable development agenda presented by the UNDP and the attention drawn to the interconnected nature of the issues presented by the pandemic.

What should be the focus be during a pandemic?

There are numerous issues that we would face as a result of the pandemic. In terms of physical aspects: health, medical, science, Information Technology; in terms of physiological aspects: mental health, spiritual wellbeing, spiritual development; the Sociological dimensions could be: reconciliation, social harmony, domestic violence, child rights; most importantly the economic dimensions are: collapse of economy, Gross National Product, development indexes, international investment and trade policies and finally to regulate the rule of law with regard to every decision taken by the global community the legal dimensions play a vital role: quarantine regulations, cyber-crimes including cyber-bullying, privacy and internet security, environmental pollution, domestic violence, and child rights. In addressing these issues there needs to be concerted efforts of all parts of government, which is why the concept of sustainable development is so crucial in developing the "winning formula". Further, as sustainable development advocates, the efforts to face and move forward from the pandemic ought to be a multi-stakeholder effort, developed through the participation of all sectors: government, private and industry, non-government, civil society, and general public. This is because the state needs the resources such as technology, capital and human resources to find effective solutions to the issues posed, and to implement the solutions. In addition, there is a threat to democracy posed due to the safety measures that are necessary during the spread of the Co-Vid 19 virus and in this context the judiciary of different countries have stepped into declare that the pandemic has presented hereto unforeseen challenges do not necessarily cause a human rights violation per se. However, there is a threat

that state powers may increase and cause democratic government to topple due to the limited functioning of the other sectors that act as watchdogs of the state. On the other hand, most developing countries in the world are facing an unprecedented challenge due to the human, social and economic cost of the pandemic. Hence this is a time that calls for cooperation of states, and stakeholders, to develop concerted efforts to face to develop the said winning formula that this research symposium seeks to discuss.

A discourse of this nature is timely and critical in this context, especially when the research priorities have changed. This conference therefore would present a valuable opportunity to the policy and decision makers, researchers and other stakeholders to evaluate the changing priorities of the research agenda for the next decade. My final message to you another advice from Buddhism: “Expect the expected and be prepared”.

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Session 01
Building Studies

Applicability of ecological footprint to evaluate environmental sustainability in apparel sector built environments in Sri Lanka

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Abstract

Environmental footprint is widely evaluated by assessing Ecological footprint, water footprint, and Carbon footprint however in context to Sri Lanka it seems evident that Ecological Footprint is not vividly evaluated hence portraying the need for assessment. This research focuses on investigating the applicability of Ecological Footprint in Sri Lankan Apparel sector-built environments. An in-depth review of the literature was conducted in order to identify the relationship between Ecological Footprint and Environmental Sustainability. Therefore, this research investigates the applicability of EF to evaluate environmental sustainability in the Sri Lankan apparel sector-built environments.

Author Keywords

Ecological footprint, Carbon footprint, Water footprint, Board of Investment, Greenhouse gas

Introduction

With the increase of the population in the Earth, the utilization of resources has restrained the regeneration or rebirth capacity of the earth. (Toth & Szigeti, 2016). Increasing human pressure on earth has acquired the evaluation of environmental sustainability. Environmental practices are usually used to evaluate environmental sustainability. Since there is a wide scope in the concept of Ecological footprints this concept has been gaining popularity. This research justifies that environmental sustainability is the main maintenance of services of nature at a respective level. Each individual human being creates an imprint within the Earth's ecosystem and this footprint ought to be measured.

Literature Survey

The concept of ecological footprint is basically the procedure of measurement of human dependence on natural resources by scheming how much of the environment is needed to sustain a respective lifestyle. On another note, we could say that the demand versus the supply. Ecology footprint is one the way to measure sustainability which makes reference to the capacity of a population to bear for the future." (Lim, 2018).

Results & Discussion

The primary purpose of this study was to assess the applicability of Ecological footprint to evaluate Environmental sustainability in the Apparel sector-built environments in Sri Lanka. The other purpose of the study was to identify the perceptions of Environmental

sustainability in the apparel sector analyzing its vitality.

Considering the strategies to reduce Environmental footprints respondents stated that managing Energy and water management strategies are currently practiced in Sri Lanka, minimizing environmental impacts. Waste management strategies are also carried out to reduce environmental impacts, which in turn minimize EF of waste generation in the factory. Commonly practiced strategies were further elaborated, as their contribution to minimizing the EF of energy consumption, water utilization, and waste generation are reflected at all the respondent viewpoints.

Conclusion

It was proved from the research findings that EF can be successfully applied to evaluate environmental sustainability in the apparel sector built environments in Sri Lanka. Strategies were proposed to overcome the barriers to apply EF. This research is concluded by emphasizing contribution to the knowledge enhancement and by presenting recommendations for industry practitioners and academic researchers.

References

- Amaratunga, D., 2007. Research Gate. [Online] Available at: https://www.researchgate.net/figure/The-research-onion-Source-Saunders-et-al2007_fig1_303674706 [Accessed 18 03 2019]. Bhat, A., 2019. QuestionPro. [Online] Available at: <https://www.questionpro.com/features/> [Accessed 20 03 2019].
- BusinessJargons, 2019. Primary Data Collection Methods. [Online] Available at: <https://businessjargons.com/primary-data-collection-methods.html> [Accessed 18 03 2017].
- Charumbira, L., 2016. ResearchGate. [Online] Available at: https://www.researchgate.net/post/What_is_the_difference_between_mixed_method_research_and_mono_method_research [Accessed 19 03 2019].

Implementation of e-tendering and electronic contracts in sri lankan construction projects: a special reference to public sector

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Abstract

Today, the growth of Sri Lanka's construction industry has become a hot topic. From small to very large scale, construction industries face a big challenge in maintaining the e-procurement related factors including e-tendering. Here in this research, a three-stage questionnaire survey was conducted in the analysis of e-tendering in Sri Lankan construction industries with 30 construction related individuals including civil engineers, Technical officers, quantity survivors and project managers.

Author Keywords

E-tendering, E-Procurement, Sri Lankan construction industries, Public sectors, Questionnaire survey

Introduction

Businesses are moving away from traditional processes to modern and efficient ways of working, mainly through electronic media. Data and information are shared and distributed digitally, formulating a cheaper and more effective way of communication. Electronic processes have the potential to generate huge new wealth and to transform the way business is conducted in unprecedented ways (Amit and Sott, 2001).

E-procurement projects are often part of the country's larger e-government efforts to better serve its citizens and businesses in the digital economy. Cost estimation is the phase of the tendering process where the contractor specifies a price for their commitment to the client. (Kim et al; 2008). The estimate is a consideration, and it will become crucial to the existence of the company. This research mainly focusses on predicting the success factors in e-tendering and electronic contracts in Sri Lankan construction industries from the conventional tendering systems with an overall concern in the public and private sectors worldwide. The research is guided by following four research objectives

1. Identify procurement issues of conventional tendering systems in construction projects.
2. Identify barriers in implementing an e-tendering system.
3. Develop the critical success factors (CSF) and implementation of e-tendering systems in construction projects.
4. Produce an online base model for e-tendering approach in construction industries

Background / Literature Survey

The first part on the literature review was focused on procurement and e-procurement

in construction industries. Again, the scope was narrowed to tendering approach. The main focus of the literature review is to review the recent developments in e-tendering, including concepts, theories, and best and worst practices, particularly in emphasizing the successful factors of e-tendering and strategies to improve user acceptance (Van Maanen et.al; 2001). Following are the research articles and journals used as the secondary information sources under each title taken in to concern.

Macro analysis of construction procurement trends in Sri Lanka

The paper discusses the change of procurement trend in the construction industry of Srilanka, focusing on the building sub-sector from year 1977 to 2003. The underlying factors responsible for the change are discussed with comparisons from other countries. (Rameezdeen, R, Rathnasabapathi, S and Amaratunga, RDG – 2005)

Identification of e-procurement drivers and barriers For UK construction organisations and ranking of these from the perspective of quantity surveyors.

This paper presents the findings of the driver and barrier verification study and the driver and barrier importance ranking survey. This research and development will result in the production of a tool to analyze the e-readiness of an organization, and hopefully this tool will allow them to harness drivers and to mitigate barriers.

E-tendering framework for public procurement in Sri Lanka

Adopting e-Tendering in pre-contract stage, yields several benefits which can be experienced directly and indirectly. In an economic point of view, e-Tendering enhances the efficiency through transaction cost savings and reduce the direct procurement costs, maintaining transparency, accountability, ease of use and speedy exchange of information including other intangible benefits such as reduced administrative costs.

Research Methodology / Materials and Methods

The data collection was initiated after a preliminary survey. Data collection involved a questionnaire survey of stakeholders in the industry, including contractors, quantity surveyors and project managers. Data collection was done according to Delphi technique. A qualitative scoping study was first conducted amongst convenience samples of the stakeholders through purposive sampling. In the questionnaire survey respondents were asked to rate the relative levels of impact of the factors of tendering as well as relative levels of effectiveness and success of e-tendering in Sri Lankan construction industries.

Survey Method

Considering the nature of the study area the Delphi technique was used to gather primary data for the research. Despite most of the previous researchers, as summarized in the literature review chapter above, had used questionnaire surveys and interviews to gather primary data, this current research will select Delphi technique over other methods considering the following reasons as to why the questionnaire survey or interview is not selected to gather primary data.

Delphi expert panel

Selecting a suitable panel of experts is the major aspect which ensures a successful survey. The key aspects of the selection process include selecting experts with the right qualifications, size of the panel, and participant commitment towards the research.

Design of Delphi Survey

• Delphi Round 1

In the first round of survey the preliminary questionnaire will be presented to the panel.

• Delphi Round 2

In the second round, each Delphi panelist receives a questionnaire that includes the items and ratings summarized by the investigators in the previous round and are asked to revise his/her judgments or “to specify the reasons for remaining outside the consensus” (Pfeiffer, 1968, p. 152).

• AHP Round 3

Considering the possibility for the second feedback and also to maintain an accuracy in the results, only the selected members (8 members) were taken in to account in this survey. Here, only the top five critical success factors selected from the 2nd Delphi questionnaire.

Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a structured technique for organizing and analyzing complex decisions, based on Mathematics and Psychology. This can be done pair wise or by comparison matrix (Pair-wise Comparison)

Results and Discussions

Survey responses

Descriptive statistics were used in the data analysis. This involved computation of statistical measures of central tendency - mean, median and mode – as well as measures of dispersion - variance and standard deviation. This helped to understand the mean ratings for each group and the variances in opinions.

Relative Significance Index (RSI) values computed from the data helped to rank-order the factors according to their risk levels.

OBJECTIVE 3: CRITICAL SUCCESS FACTORS (CSF) OF E-TENDERING

Criterion	Comment	Weights	Rk
1 CSF1	Trained and skillfull employees	25.5%	2
2 CSF2	It infrastructure within the organization	29.5%	1
3 CSF3	Level of top management support	11.7%	5
4 CSF4	Increased tender opportunities	14.8%	4
5 CSF5	Increased efficiency and effectiveness	18.5%	3

Conclusion / Further Work

Summary and study

In this research consideration have been given to recognize applicable causes of construction projects in Sri Lanka out of which the most significant factors which can be deliberated as issues of a conventional tendering system and the barriers which make the web-based tendering not to be implemented.

Conclusion

This paper has explored the leading tendering related factors in the Sri Lankan construction industry, their possibilities of replacing a conventional tendering to a web based tendering approach. The results highlighted many factors which were segregated into 3 broad categories.

References

ABS (1999). Government Use of Information Technology (8119.0): 1997-98. Canberra, Australia, Australian Bureau of Statistics (ABS).

Anumba C.J. and Ruikar K. (2002). "Electronic Commerce in Construction: Trends and Prospects." Automation in Construction 11.

APCC (2001). B2B E-Commerce: Capturing Value Online. Canberra, Australia, Commonwealth of Australia - Australian Procurement & Construction Ministerial Council (AP CC).

B&C Watch (2001). Online Tenders Generate Govt Savings. B&C Watch: Slattery's Watch for the Building and Construction Industry. 9 October.

Foddy, W. 1993. Constructing questions for interviews and questionnaires. Cambridge: Cambridge University Press

A study of building procurement process as a potential tool to enhance the safety practice in the construction industry

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Abstract

Procurement is simply defined as the way of acquiring or purchasing goods or services. There are many different routes by which the design and construction of a building can be procured. The selected procurement route should follow a strategy which fits the long-term objectives of the client's business plan. The considerations are that could include like speed, cost, quality, specific project constraints, risk, asset ownership and financing.

Author Keywords

Procurement, Design and build, Traditional procurement, Client, Consultant

Introduction

The construction industry is one of the fastest growing industry in the world. With the increasing of population the utilisation of land space has increased to accommodate human for shelter hence the construction industry is also increasing widely. The construction industry is one of the fastest growing industry and as well as it contributes largely to country's economy. There are many procurements available. We can mainly classify into two main categories and they are traditional procurement and alternative procurement method. Traditional procurement is a procurement that is widely used in Sri-Lanka this procurement involves the involvement of three parties' client consultant and contractor. Client is basically initiating the concept and starting the project then the consultant comes in play. The consultant will prepare the drawings, specification and the scope. Then the contractor will be selected based on price competition in another words tender. Then based on the lowest best price a contractor will be selected and offer letter will be given and then the letter of acceptance once the contractor is entering into contract. Then the contractor will start the construction and will hand over the project to the client.

Literature Survey

The construction's health and safety is affected negatively by inadequate or lack of taking health and safety measures which results in fatalities, injuries and disease. When it comes to procurement practices it summarizes bidding practices, contract documentation, and project leadership, co-ordination of design and construction, design, details and specification, project priorities, project duration and project relationships. When it comes to the requirement to enhance or to catalyze the health and safety of the construction industry and the ergonomics is inclusive.

Results & Discussion

This research emphasises on safety practice and its improvement in the construction industry so that through improving procurement process the construction industry will be safe along with its stakeholders which finally enables trust. For this purpose, the research framework lies on procurement process and individuals involved particularly in ensuring commitment to enhance safety practice across project procurement.

Conclusion

As a summary of this research, what could be derived is the importance of procurement in any construction industry. Sri Lanka construction industry seems to be in early stages for this which is why high attention needs to be provided in terms of health and safety since a large population is employed in this sector.

References

Adam, 1976. Accident Causation and the Management System, London: Professional Safety.

Ashworth, W. a., 1999. 1987. Practice and Procurement for the Quantity Surveyor. 9 ed. Oxford: BSP Professional Books. A, T. B., 2013. Man-Made Disasters, London: Wykeham. B, M. a. Q., 1995. Institutional Development. The Journal of Construction Procurement,, 1(1), pp. 150 - 164. Davidson, C. H. & M. R., 1987.

Building procurement - a strategic and management, London: International Building Research Council) 5th International Symposium of commison 65. Engineering, B. C., 2020. Procurement methods in Construction Industry. [Online] Available at: <https://basiccivilengineering.com/2016/10/procurement-methods-constructionindustry.html> [Accessed 29 April 2020]. Health, I., 2017.

Occupational safety and health in construction: a review of applications and trends, 55(3), p. 218.

Important of Healthy Building Concept in this Present Covid-19 Situation-Case Study

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Abstract

COVID-19 has joined several points that link structural conditions to human well-being. Natural ventilation and daylight area unit primarily required within the current Covid-19 state of affairs. during this context it's crucial to style buildings with dormers, giant windows, rooftops, balconies and patios to avoid sick building syndrome and improve air quality, there's no proof that mechanical ventilation has contributed to the unfold of infection in homes , though a large form of microorganisms would are found within the ventilation outlet. Recent studies on the corona virus (Covid-19) counsel that the virus behaves otherwise and features a completely different completely different time period with different material surfaces. In daylight or within the sun, smart windows and daylight in structures are shown to influence the spread of airborne pathogens. Clearly, before the arrival of antibiotics, ventilation and daylight were thought of vital safety measures against infectious diseases. This text concludes that ventilation, daylight and finishing materials decrease to stop covid-19 within the building.

Keywords

Natural Ventilation, COVID-19, Natural Ventilation, Skylight, finishing materials, airborne

Introduction

COVID-19 has created several issues associated with buildings and human health. Though we have got long understood this association, the pandemic has accelerated action. As we have a tendency to work with our customers to resolve their corona virus problems, we want to style healthier buildings. This implies that specific building style ways for infection hindrance should be manipulated during this new world of the corona virus era. What we will do is bring peer-reviewed external best practices from trusty sources and facilitate implement them in buildings to mitigate risk. During this case, the planning of the building and also the alternative of materials are centralized by the engineers to develop the living conditions of the occupants.

Background / Literature Survey

Ventilation and sunlight mainly required in present Covid-19 situation. After forced self-isolation and spending more time indoors, an approach to improving health through strategies such as greater natural light, improved ventilation, fewer toxic substances, and incorporating plants and other natural materials is necessary (Constable, 2020; Lubell, 2020). In this context, it is critical to design buildings with skylights, large windows, rooftop terraces, balconies, and courtyards to avoid sick-building syndrome and enhance air

quality (Guy & Farmer, 2001; Roaf, Crichton, & Nicol, 2010). There will be a special effort to consider and think about every possible place within the built environment touched by people and the possibility of that being a source of infections. Like the modernists who rejected ornament in service of hygiene, contemporary designers are likely to use hygienic and anti-bacterial materials that can be easily sanitized (Kashdan, 2020; Molla, 2020). Post-pandemic architecture might apply more cleaning strategies based on new technologies. For applying a strategy based on nanotechnology, we should consider other potential risks associated with nanomaterials (Megahed, 2013). The above-mentioned personals have analyzed the ventilation and sunlight of the buildings.

Research Methodology

In this analysis, we tend to think about the findings and embody the factors that build healthily between the inside and exterior of the building. From this analysis, they embody specific style ways for infection hindrance during this new world of the corona virus era. During this analysis, I principally think about the development of a hospital.

Discussion

Design to enhance natural ventilation

Recent studies have shown that associate degree adequate ventilation rate will effectively scale back the danger of infection from mobile infections in health care facilities and public areas. Natural ventilation will offer a better ventilation rate than motorized ventilation in associate degree energy economical manner. A study of isolation wards in Chinese hospitals found that those with a high proportion of open openings were additional productive at preventing the severe acute respiratory syndrome scourge among health care employees than different models accessible. The ventilation rate needed by CDC-ACH is 12ACH, which suggests that because the ventilation rate will increase (ACH - air modification per hour), the danger of infection would be considerably reduced. (B.Bajracharya, 2019)

In another study, Escombe, Eduardo, Victor, Manuel and David adopted the carbonic acid gas tracer gas technique to investigate pre and post modification situations for a region. the target was to look at the evolution of the danger of TB transmission within the workplace and also the lounge. The result indicated a mean decrease of seventy two (interquartile vary 51-82%) within the calculable risk of transmission of TB for patients and health care professionals. Therefore, adequate ventilation might be a remedy for kerb the unfold of infectious diseases like COVID-19 in hospitals, schools, offices and different public areas. Additionally, the study suggests the subsequent style measures; Adequate cross ventilation is needed in hygienic facilities. Hallways ought to have associate degree open finish to make sure associate degree adequate ventilation rate, as shown in Figure 1. Wherever potential, hallways or closed hallways ought to be avoided. Offer a ceiling ventilation window within the hall partition wall and ventilation make time for the door stopper to cut back the circulation of hot air. Integrate the yard style to determine a cohesive ventilation passage, use the yard house as associate degree ecological exchange house, do the general style of the building structure / open house layer and make associate degree integrated ventilation channel to permit natural hospital building ventilation as shown in Figure 2. The planning approach will increase the ventilation rate (ACH - air modification per hour), that greatly reduces the danger of infection. However, there's no proof that mechanical ventilation helped unfold the

infection in homes, though a good form of microorganisms were reportedly found within the vent. (B. Bajracharya, 2019)

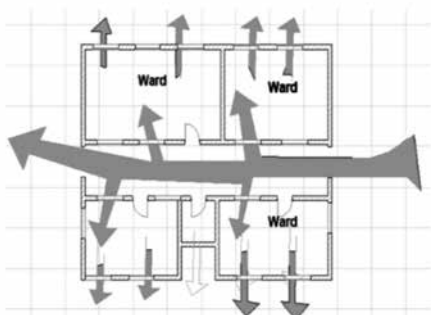


Figure 2 Example of Open-end Corridor

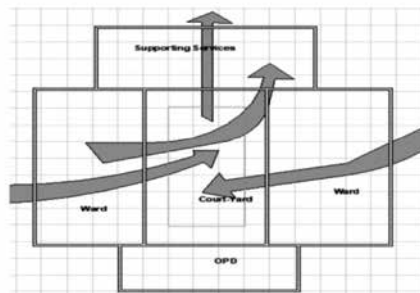


Figure 1 Example of Court-Yard approach

Design to Enhance Daylight or Sunlight

Good glazing and natural light-weight in structures are shown to influence the unfold of mobile pathogens. It's clear that before the appearance of antibiotics, ventilation and daylight were thought of vital safety measures against infectious diseases. Solly added that direct sunlight through glass may well kill bacteria bacillus in a few minutes or hours subject to the thickness of the layer of bacteria exposed, moreover, diffuse sunlight found near windows in buildings may well kill bacteria in five to seven days. Advanced Studies indicated that sunlight can kill a variety of bacteria such as anthrax, tuberculosis, etc.

Day lighting is a good germicidal factor and can inhibit infection. Lytle and Sagripanti added that sunlight or, more specifically, solar radiation (UV) acts as the principal natural virucide in the environment. The standard for measuring daylight or sunlight is UV index and the germicidal effectiveness of UVC peaks at about 260-265 nm. It is important to note that the most effective and commonly used wavelength for ultraviolet germicidal irradiation (UVGI) is ultraviolet C. Unfortunately; only a small percentage of it reaches the Earth's surface as most are absorbed by the ozone layer. It simply follows that as part of infection prevention and control, there should be adequate openings that will allow daylight into hospital wards, rooms, offices corridors, and stairwell. Designing buildings with better exposure to sunlight and outdoor air may inhibit the survival and transmission of infectious causes with resulting health benefits for dwellers. (K.C Tharanga, 2009)

Design with adaptive finishing materials and construction methods

Recent studies on the corona virus (covid-19) counsel that the virus behaves otherwise and encompasses a completely different completely different} period with different material surfaces. A study by Doremalen et al. Shows that the corona virus is a lot of stable on plastic and steel (up to three days) than on spongy materials like cotton, animal skin and even cardboard (<24 hours), whereas constant virus strain doesn't survive solely four (4) hours on copper surfaces. Therefore, architects have to be compelled to rethink the fabric choice method, write material specifications and surface treatment. supported the analysis, the subsequent suggests:

Specify copper fertilized or plated materials for surfaces that are overtimes touched, like

step handrails, balcony rails, side rails, style and place sinks to facilitate improvement and stop trash from spilling into sensitive areas. Coated with an anticoagulant medication mixture in cement screeds or with high resistance and softness. Apply POP screed once coating with cement to enhance smoothness and eliminate tiny voids on the wall surface or use roofing materials like special paints; the utilization of fine sand texture paints ought to be discouraged. Entrance doors and curtains in hospitals and high traffic public areas ought to be designed with sensors to enhance automatic gap and shutting. this may greatly scale back contact with the handle and therefore stop transmission. Multiple accesses to public areas ought to be decreased to permit effective federal agency compliance management. Sinks with motion sensors additionally to eliminate some transmission prospects. Controls and instrumentation ought to be such with fewer flat surfaces wherever particles will land, in addition as negligible crevices and holes for trash assortment. By reducing the amount of horizontal surfaces like protrusions, the unfold of infection are often reduced.

Conclusion

In conclusion, buildings designed with more or less access to daylight can play a key role in influencing indoor microbial dust communities. This can be achieved in the early stages of design, specification writing and construction. Daylight should be integrated into the lighting design of buildings, not only because it helps inhibit bacterial and viral infections, but also because it eliminates the need for artificial lighting, which in turn leads to energy savings and contributes to environmental sustainability. While UVC is the most effective wavelength for infection control, only a small percentage reaches planet Earth. The implication is that more daylight is needed in care facilities, schools and indoor environments. The document also suggests the use of special ultraviolet radiation systems, especially in healthcare facilities where sunlight cannot be guaranteed.

References

- Anon., n.d. Google. [Online]
Available at: <https://www.hok.com/news/2020-09/covid-19-pandemic-underscores-the-importance-of-healthy-buildings/>
[Accessed 05 12 2020].
- Anon., n.d. Google. [Online]
Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7313520/>
[Accessed 10 12 2020].
- B.Bajracharya, S., 2019. The thermal performance of traditional Residential Buildings in Kathmandu valley. Volume 2.
- K.C Tharanga, T. M. R. R., 2009. The Effect of Passive Techniques in Old buildings in Sri Lanka. Volume 3.

Impact of Covid-19 to the Construction Industry in Sri Lanka-Case Study on a Questionnaire Survey

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Abstract

The construction industry and civil engineering contribute significantly to the GDP (gross domestic product) of Sri Lanka. The lockdown caused by the COVID-19 pandemic has created all the civil engineering design offices and construction projects to abruptly end all construction work on site and convert it to work from home for the designers. This statistical study aims to determine the impact on Sri Lankan civil engineers of current market foreclosure practices, expected results and their vision of the future of civil engineering and the construction industry. To achieve this, a case study is based on one an online questionnaire was administered. The results show that civil engineers have been able to work reasonably efficiently from home, while civil engineers on construction sites do not believe that construction workers will observe social distances and wear protective clothing once the blockage is lifted. individual essentials. In addition, other negative effects on the construction sector were investigated.

Keywords

COVID-19, GDP, Civil engineers, Questionnaire

Introduction

All sectors of the world are affected in many ways by the COVID-19 infection. This includes engineering and construction. Thus, delaying construction projects. Global and local supply chains are under pressure. At the same time, it concerns the health and safety of employees. And many important construction and engineering companies operate without significant reserves. The effect may be to force some to repay the loan. And seek new sources of capital. Many tall buildings and projects are in a recession as work has come to a complete halt due to delays in purchasing goods from China and lockdown due to the COVID-19 infection.

Background / Literature Survey

Many construction companies around the world have stopped working because of the COVID-19 infection. Likewise, the work of several construction companies in Sri Lanka has been suspended. From this point of view, the structures have been strongly influenced. Colombo Port City Project, Hambantota Port Project and other

port development, Western Region Light Rail Transit (LRT) PPP project in Colombo, Kerawalapitiya Combined Cycle Power Plant, ITC Colombo a hotel and residences, Grand Hyatt Colombo, Altair Sri Lanka Luxury Apartments and Condos .

The government has also decided not to launch new projects. Therefore, we predict that at least 100,000 people will be out of work if work is not resumed soon. About 650,000 people work in this sector, of which at least 200,000 are not yet active. However, workers in large construction companies received 50% of their wages during the exclusion period, but those who worked for subcontractors found it difficult to move around. The government also decided not to create a new one. The main Sri Lankan contacts have projects worth around 600 billion rupees. Some of the biggest projects in Sri Lanka include the China-funded highways, the port city, and the Shangri-La apartment project. "But less than 50 percent of the projects have started," he said. "Businesses are in trouble because some overdue payments have yet to be made. It's about 100 billion rupees. (JAYASINGHE, 2020.06.26)

Methodology

This study is a cross-sectional study based on a self-completed online questionnaire. The study involved civil engineers aged 22 to 65, who currently work in an office or field job at a Sri Lankan construction company whose offices and projects are all located in Sri Lanka. Data collection took place between 13 December and 17 April 2020, with 10 engineers completing the questionnaire.

Results & Discussion

To our knowledge, this is the first study examining the impact of COVID-19 on civil engineers and the construction industry. Most Sri Lankan engineers have seen their jobs affected by the pandemic. The economic costs of enforcing a blockade are undoubtedly enormous, even though that blockade was essential to contain the spread of COVID-19, reduce the number of critical cases and ultimately reduce the number of deaths. This underlines the importance of developing an integrated multidisciplinary plan for the post-blockade period, taking into account all sectors, including the construction sector. During this pandemic. Most engineers who worked in the office (51.1%) did not notice any change in their productivity in the present study, 19.4% increased productivity, while 29.5% complained of a decrease productivity. The productivity and job satisfaction of homeworkers varied widely in the literature. This can be attributed to the multifactorial effect of organizational, occupational, individual and family factors on the productivity and overall satisfaction of these workers.

Therefore, we recommend future studies to investigate the effects of these factors in order to make recommendations for working from home, which will ultimately help increase the productivity and satisfaction of these engineers. The applicability of social distancing, improved health measures, and the provision of personal protective equipment to workers and engineers during the pandemic is still underestimated, especially given the alarming lack of equipment. personal protective equipment for primary health workers in developed countries. In addition, with the varying availability of safety tools on Jordanian construction sites and the limited availability of some personal protective equipment, it is essential to ensure the availability of all essential personal protective equipment and building safety tools. , as well as the implementation of an infection control policy. on all

construction sites in Sri Lanka.

Only 40.7% of the engineers in this study were aware of the presence of a contingency section, defined as delays due to force majeure in various legal documents, as an acceptable cause for delays in their contracts. It is important to note that as each contract spells out the force majeure clause differently, the applicability of the clause in the current COVID-19 pandemic depends on how it is worded in their contracts. The COVID-19 pandemic could have unpredictable socio-economic consequences and affect the construction industry around the world. Several studies suggest that a possible economic depression could follow this pandemic, for which the construction and engineering industry must plan in the future to manage this unwanted economic consequence.

Conclusion

In conclusion, the COVID-19 pandemic is a health, economic and social crisis that has affected all segments of the population and all economic sectors. As the construction industry is a major tributary and major pillar of the economy, action is needed to contain the effects of this pandemic on this key sector of the Sri Lankan economy. Sri Lanka controlled the coronavirus outbreak with aggressive contact monitoring, despite some shortcomings in testing, and has since expanded its business activities to resume them in accordance with health guidelines and social distances.

References

- Anon., 2020. WWW.GOOGLE.COM. [Online]
Available at: <http://www.ft.lk/front-page/Construction-best-COVID-19-counter-ICRA-Lanka/44-701242>
[Accessed 13 12 2020].
- Anon., 2020. WWW.GOOGLE.COM. [Online]
Available at: <http://www.ft.lk/front-page/Construction-best-COVID-19-counter-ICRA-Lanka/44-701242>
[Accessed 13 12 2020].
- Anon., n.d. WWW.GOOGLE.COM. [Online]
Available at: [https://uk.practicallaw.thomsonreuters.com/w-017-6138?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-017-6138?transitionType=Default&contextData=(sc.Default)&firstPage=true)
[Accessed 16 12 2020].
- Anon., n.d. WWW.GOOGLE.COM. [Online]
Available at: <https://www.pwc.com/lk/en/insights/beyond-covid-19--three-key-priorities-for-engineering-and-constr.html>
[Accessed 17 12 2020].
- Anon., n.d. WWW.GOOGLE.COM. [Online]
Available at: <https://www.whitecase.com/publications/alert/covid-19-current-impact-construction-engineering-projects>
[Accessed 16 12 2020].

JAYASINGHE, C., 2020.06.26. Sri Lanka construction industry fears 100,000 jobs losses after Covid-19 crisis, stalled payments.

WWW.GOOGLE.COM, n.d. [Online]

Available at: https://www.researchgate.net/publication/345709623_Impact_of_Covid_-19_Pandemic_to_Construction_Industry_in_Sri_Lanka
[Accessed 12 12 2020].

Cost overrun, in construction of building projects in Sri Lanka

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Abstract

The problem of spending in the construction sector is a global problem and the construction sector in Sri Lanka is no exception. The main purpose of the study presented in this article is to identify cost sources for overcrowded construction projects in Sri Lanka. To conduct the study, a comprehensive literature review was conducted from a variety of sources. The measures were done to determine the causes costs to customers as consultants, contractors, financial management resources from outside.

Keywords

Financial management, Financial improvement, Time overruns, Design section, Management section

Introduction

The development businesses have been had a huge effect on the money related arrangement of the nation all around the globe. The production industry offers the Gross home item and work rate according to Olawale (2010). So it is taken as large for the Financial improvement of the nation. As per (Ali and Kamaruzzaman, 2010) scope, cost, time and fulfilment are the principle Four straightforward components are accustomed to dealing with the Building project. There must be considered to effectively to accomplish the work. Be that as it may, numerous difficulties find a good pace the board in a limit of the nations. Cost invade is a huge issue in all buildings.

Literature Survey

Many papers and studies have been published Executed in the context of cost overrun in Architecture and civil engineering projects. These investigations did globally and in the creating nations. Right now short presentation was determined. This section comprises improving the information by perusing the examination region to discover the exploration issue.

Results & Discussion

The financial problem is for the most part impact the cost invades. Here some parcel of causes is distinguished as huge causes. They are absence of venture reserves, Contractor's income issues, and Fluctuations in the expense of building materials. The absence of venture reserves is in the first of in general position and its possibility of an event is 77.94 %(RII). Temporary worker's income RII score is 75%. Changes in the expense of building materials arrive at 75% of RII score.

Conclusion

The Conclusion finds the accompanying outcomes dependent on the Building Project Construction Survey poll. The components connected to the fund are recorded as the most significant causes. Right now significant reasons for cost overruns have been found. Configuration Related causes were in the second position in light of the fact that the possibility of an event for the plan changes right now higher than different reasons for cost exceeding.

References

Abraham, G. (2003) Critical success factors for construction industry.

Construction innovation. Akinci, B., Fischer, M. and Zabelle, T. (1998) Proactive approach for reducing non-value adding activities due to time-space conflicts.

In Proceedings of Sixth Annual Conference of the International Group for Lean Construction (ICGL-6), Sao Paulo, Brazil. Baloi, D. and Price, A. D. (2003) Modelling global risk factors affecting construction cost performance.

International Journal of Project Management. Eden, C., Williams, T. and Ackermann, F. (2005) Analysing project cost overruns: comparing the “measured mile” analysis and system dynamics modelling.

International Journal of Project Management Bordat, C., Sinha, K. and Labi, S. (2004). An Analysis of Cost Overruns and Time Delays of INDOT Projects. Purdue University Press.

Effect of Using Software for Measurement in Sri Lankan Construction Industry

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Abstract

Measurement is an important part in Quantity Surveying work in construction industry. It mainly focuses on taking off and BOQ preparation. Most of the construction companies in Sri Lanka use different software's such as, MS office, Auto CAD, Revit, Cubit and Cist X to do measurement related works as tendering for a project, payment for sub-contractor, Interim payment and final account. In this era computer is an inevitable equipment to do complex task in every industry. However, some construction companies still using traditional methods of measurement procedures. In study, problems in implication of software in construction companies in Sri Lanka and unawareness of certain software techniques and employees using a traditional method of measuring also analyzed. The pros and cons of using software also discussed. Further, the study reveals knowledge of using software in industry, method of developing the existing 50 randomly selected local construction companies from nine district, statistical data was gathered through questionnaires' and interviews. According to analysis of collected data, research reveal that around 90% of selected companies use application software for measurements and effectively solved the measurement related issues. The rest 10% of companies which unfamiliar the software professional faced wide range of problems with their competitors due to lack of knowledge in software.

Author Keywords

Measurement, software's, construction industry.

Introduction

In modern world computerize software are very important in every industry. Construction industry also using computerized software for doing various things. In this research implication of software in construction companies in Sri Lanka and unawareness of certain software techniques and employees using a traditional method of measuring also analyzed.

Methodology

The main source of information for this study was e-mails. Questionnaire was send it to 75 companies around Sri Lanka. And collected information was analyzed. Participants claimed many advantages of using software in construction industry.

Measurement is an important part in construction industry. Measurement is the transformation of drawn information into description and quantities, undertaken to value, cost and price construction work as well as enabling effective management.

Importance of measurements

- It helps easy to do the construction.
- Saves huge amount of time, money and labour.
- It may improve company reputation.

Standard method of measurement

This is important since there is a uniform basis for measuring building works in order to facilitate industry wide consistency and benchmarking, to encourage the adoption of best practice and to help avoid disputes.

This provides a structure which should make up the description for the information, and also it provides rules as to what is included within each item.

- Measurement mainly focus on taking off and BOQ preparation. Taking off is the process of identifying elements of construction works that can be measured and priced. There are various elements use to prepare a taking off number, length, area, volume, weight...ex.

In Sri Lanka most of construction companies use different software to do measurement related works as tendering for project ex. There are many software such as Ms Office, Autodesk Auto CAD, Autodesk Revit, Cubit, Cist X, B2W Estimate. Some companies still using traditional methods of measurement procedures.

There are many advantages when using computerized methods at the companies.

- Time

In computerized methods save your time. Ex: if you draw a simple house plan. If you draw it, using Auto CAD you could finish it nearly within one hour. But if you draw it manually, you would waste six or eight hours for it.

Time is very important for an organization. Time is their money. Many companies using Ms EXCEL need estimate sheet, measurement sheet, BOQ. In Excel, we could calculate totals, differences easily. ex: If we use traditional method we may need long time for finding that information.

- Speed

Speed also very important and higher speed saves our time. By using computerized methods we could achieve higher speed.

- Accuracy

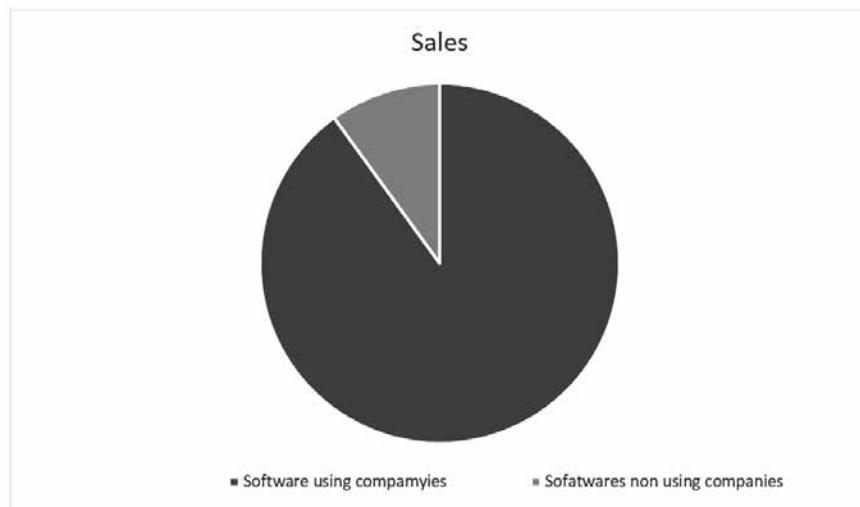
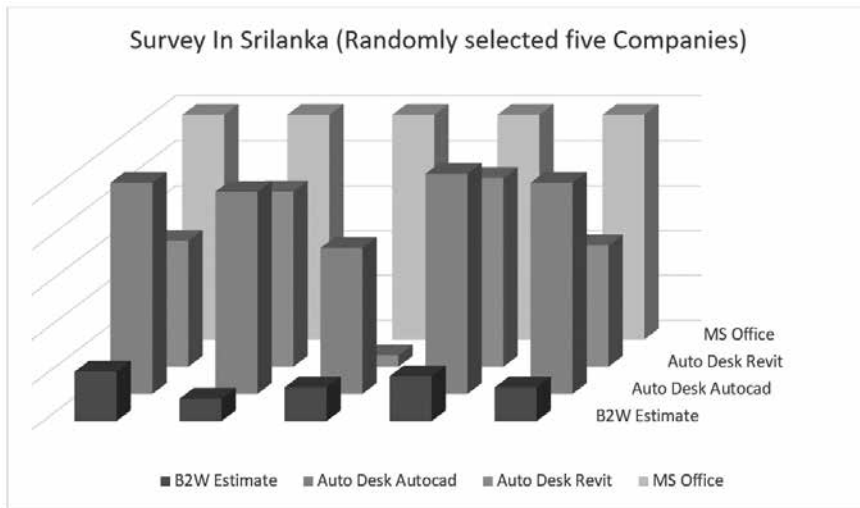
In computerized method accuracy is higher than traditional method. BOQ or an estimate prepared by using traditional method would be less accurate. Accuracy is also very important because they effect the cost.

- Easy to manage

By using a computerized method, we could manage our documents easily. If we want to find some important information, we can find it quickly and easily by using computerized method. Use of a traditional method cause lot of time for it while we tend to forget correct position of that information.

Experimental

The experimental phase took place in Sri Lanka. Sample consists of 50 construction companies. They used MS Office, Autodesk Revit, Autodesk Auto Cad, Adobe Reader, Cubit, Cist X, B2W Estimate software.



Conclusion

From the above survey conducted through 50 companies around Sri Lanka. But some companies using traditional method also. All companies using MS Office. In this survey shows that in Sri Lankan construction companies using software for measurement greater than 90%.



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Session 02

Computer Science

Descriptive study on the health impact of excess use of smart phone in view of digital wellbeing

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Abstract

The use of smartphones in daily life has increased because it is an easily accessible communication tool that people can carry with them everywhere. Increased use of smartphones with technological advancements has increased their effect on daily lives of people. Today, smartphones have become an important part of the daily because it is the main tool used for formal and information communication. Specifically, young adults are most likely to own a smartphone compared to any other age group. Calling family and friends and connecting to the Internet are carried out via smartphones. With this increasing interest, it has become important to study the effects of smartphones on human health. Some users have experienced physical health issues during or after the use. It has been stated that the main cause of these issues is the excessive use of smartphone. This research studied about the health impacts of excessive use of smartphones among adult learners at BCAS Campus Kalmunai. From the findings, it suggests that prolong use of smartphone causes so many negative impacts on human health not only identified in this also physical and mental effects. The finding of this study helps to identify the negative impact of smartphone that can negatively affect learning. Furthermore, the finding could encourage other researchers in this field to investigate method to overcome the negative effects that learners may have to face should this not been intervened in a proactive manner.

Keywords

Smartphone, Digital Wellbeing, Health Impact, Learners, Technology

Introduction

The use of mobile phones has increased substantially and has been paralleled by a growing concern about the effects on health. A world-wide popularization of smartphones and a little knowledge about their side effects on learner's health have mentally and physically affected by their excessive use. This report discusses the Negative Health Impact of excessive use of Smartphones Among Adult Learners with reference to BCAS Campus, Kalmunai. The evolution of the information society and the excessive use of smartphones make the adult learners omnipresent in all areas of life. Increased exposure to this type of field raise questions and concerns about their impact on health. As a result, most of the students are complaining of Headache, Eye pain, Tiredness, Sleeping, Neck pain. Another way that smartphones cause problems is that because young adult learners are spending too much time on digital devices which is also interfering with their education as well.

Literature Review

According to Fedorov, O. and National Cancer Institute, there are certain harmful health effects, which might be caused by the immoderate use of cell phones. According to modern research, the most menacing problem is connection between smartphones and cancer. Even though the data remains controversial, most scientists agree that there is a certain threat from using cell phones too much. The International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as “possibly carcinogenic to humans” and associates it with wireless phone use. According to Joseph F. Hayes and et al, they fully appreciate the potential for digital health promotion that is required to understand the harms and benefits of smartphones use, particularly if this usage has a differential impact on subgroups.

Methodology

Questionnaire method that assessed the physical effects were included. Since the study is descriptive where it attempts to describe the position of undergraduates. Following conceptual framework was derived from the theoretical and empirical review of relevant literatures.

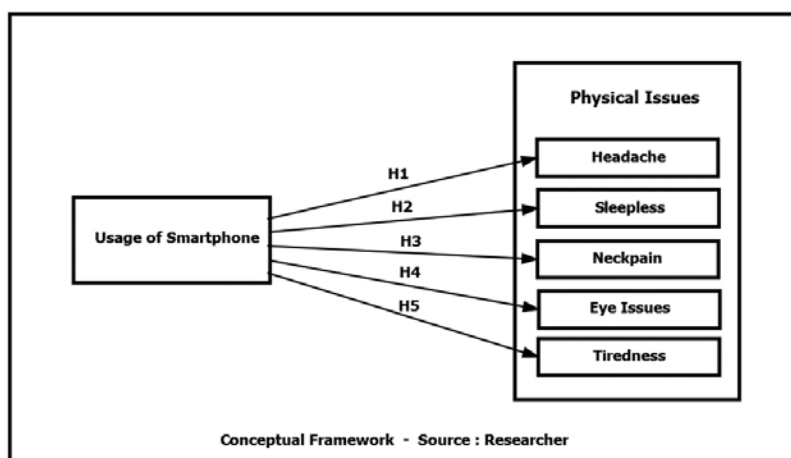


Figure 1 - Conceptual Framework

Results and Discussion

Quantitative data analysis was used to analyze the data. Exploration of the data has been made with descriptive statistics and graphical analysis. The analysis included exploring the relationship between negative health impacts and young adult learners.

Demographic Data		Percentage of Respondents
Gender	Male	62.5%
	Female	37.5%
Department	Computing	60%
	Business Studies	5%
	Engineering	5%
	Legal Studies	5%
	Management	7.5%
	Access Or IBP	17.5%
Age	18- 22	37.5%
	23-25	50%
	>25	12.5%

Figure 2 - Demographic Data of Respondents

Perception about the use of Smartphone

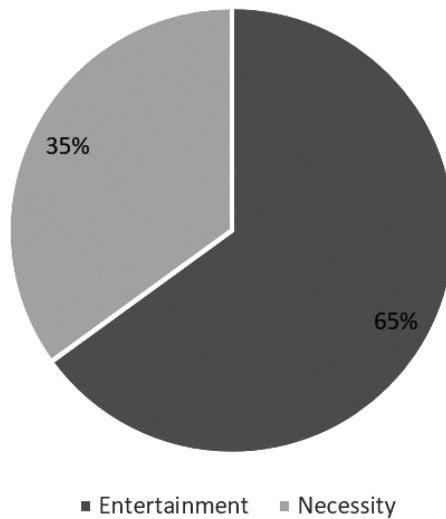


Figure 3 - Perception about the Use of Smartphone

Based on Figure. 3 where over 65% of the respondents perceive smartphone as a tool for interacting in social media and a mean for entertainment. This research describes the position of the young adult learners that they are prone to suffer due to the excessive use of smartphones. Adults who are under 25 years, especially 18 – 25 are long time users of smartphones on daily basis and also those learners have eye issues, discomfort or tiredness in their body after using smartphones longer than 3 hours. Meantime it was also evident that they use smartphone in dark. All the respondents use smartphone for only two purposes. However, in questionnaire, respondents were asked to prioritize activity while using smartphones. Wide range of respondents use for entertainment and few of them are used mainly for conversations like chatting on WhatsApp, viber etc. from that, Most of the Adult learners are using smartphones for the entertainment purpose and also most of them experience harder to fall and stay on sleep during nights.

Conclusion

Questionnaire results revealed that over usage of smartphones affected on young adults health. Mainly, prolonged use of smartphones and using phones in dark increased eye issues, discomfort like tiredness, headache and sleeplessness related health impacts but least learners have experienced neck pain. Also, Most of the Computing learners admitted that they have experienced all the health impacts which have been mentioned as variables, that might be caused by the extended use of smartphones and other digital devices. Therefore, it is recommended to create awareness among school leavers about the impacts that they may have in future due to the prolonged use of smartphone. Therefore, awareness programme can be included as part of the orientation for the new students at the higher educational institutes in order direct students towards using smartphone for their personal and professional betterments.

Reference

SH, Choi SY, Park DH. (2013). [Online]An empirical study on relationship between symptoms of musculoskeletal disorders and amount of smartphone usage. J Korea Saf Manage.

Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4499974/>
[Accessed 03 02 2020].

Gold JE, Driban JB, Thomas N, Chakravarty T, Channell V, Komaroff E. (2011).[Online] Postural, typing strategies, and gender differences in mobile devices usage: An observational study. Department of public health, Tample University

Available at: <http://www.academia.edu/17009351/>
[Accessed 23 03 2020].

Karlson AK, Bederson BB, Contreras-Vidal JL. (2006). [Online] Understanding single-handed mobile device interaction. HCIL Tech Report, Human-Computer Interaction Lab, University of Maryland, College Park.

Available at: <http://www.cnn.com/2013/09/23/living/parents-kids-addicted-cell-phones/>
[Accessed 07 07 2020].

Rebuildyourvision (2016). [Online]

3 Eye Exercises to Reduce Eyestrain & Improve Eyesight.

Available at: <http://www.rebuildyourvision.com/blog/vision-training/3-eye-exercises-to-reduceeyestrain-improve-eyesight/>

[Accessed 23 03 2020].

Impacts of video games and movies in the behavior of youth: How they react to problems

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Abstract

Technology and its rapid growth has changed the world a lot. People are more attached toward technology and digital devices as it is inevitable. Technology and digital devices play a major role in youth's life. Most of the youth are addicted for video games or movies, because of this reason they face many problems in their day to day life such as health issue and mental issues and more. This research mainly focusses on impact of video games and movies in the behavior of youth and how they react to problem. So far according to the researches done by others they have found out that video games effects the behavior of youth, especially violent video and Action movies encourage the youth to resolve problems like they do. The data needed for the research was collected using both and primary and secondary method. This research's main aim is to identify the behavior changes of players/viewers who are addicted to video games/movies. The data's collected by the survey are analyzed and uploaded to website. In the website viewers will get to know about research and how it impacts our life style with that they can read some real-time experiences, and also can take part in a survey. The data collected by the survey was analyzed and found out some question have relationship with each other that directly connect to the behavior of youth. Those questions were selected separately and compared with each other to identify the relationship with them by calculating the percentage among and analyzing the fact was finalized that violent video games and action movies make an impact on youth life especially when solving problems.

Author Keywords

Video games, movies, youth, behaviors ,reaction to problems.

Introduction

Technology and its rapid growth has changed the world a lot including people and their behavior. Especially digital devices have become inevitable, it has become a basic need for every person. Due this reason concept of digital wellbeing was introduced to manage their life balance using digital devices. Development of technology and digital devices has badly affected the youth. They have become too much addicted to it.

This research is all about youth who addicted video games and movies and how they react to problems. This has become a major issue in this time period most of them believe, youth who involve most of the time in video games and movies react to problem as they do in them and also this has a connection with crime acts too. The main aim of this research is to identify the impact of video game and movies in the behavior of youth and how they react to problem or solve their problem in their day today life.

According to the researches done so far they have found out that video game and movies have impact on youth when solving problem. But there is no any proper co- relationship

how it impacts on them through this research mainly focus on how the co-relationships, how it makes an impact in youth life. This research doesn't include any other issues regarding video games and movies. And this research is done by collecting data from a survey, all the collected data will be kept confidential and will be used only for the research purpose.

Main purpose of this research is to help the youth community who are suffering from this situation and also have a clear and vast idea on how behavior changes with long time addiction of video game and movies with to that make an awareness among the society about the effects of video games and movies in our daily life specifically how it connects with behavior and problem solving.

Hope this research will provide a clear idea on the above mentioned area and will be helpful to people and youth who do research regarding this and readers who interested in this topic.

Methodology

Data Collection

• Secondary data collection

Secondary data was used to get more idea related to video games and movies and the connection between the behaviors of youth through literature review. In literature review existing researches, report related to the topic was studied to develop question needed for the survey.

• Primary data collection

Primary data collection was done in order to collect data needed for the analysis through a survey with a set of question derived from studies and observation done related to the topic. Survey was developed using google form and the link was shared through social media platform among the youth around the country.

Process

- Data collected was extracted to an excel sheet and every answers from different questions was given a variable to make the analysing easier. Question which showed direct connection to the impact of video games/movies in the behaviour was grouped separately, from those questions two pairs two different set of question was compare to identify the relationship among them. Orange software was used clearly identify the how selected facts of question effect the behavior.

- The website was built to make an awareness among the society, through website the visitors will get to know some real time experience of people who got effected by this situation and can participate in the survey to get to know about the position of them regarding issue. With that website provide some hints that will help the reader to get a solution or an idea concerning to the issue they have. The tools used to build the website is Atom IDE and the techniques are HTML to build the website and CSS for design purpose.

Experiment

Result was obtained using the analysis done as below.

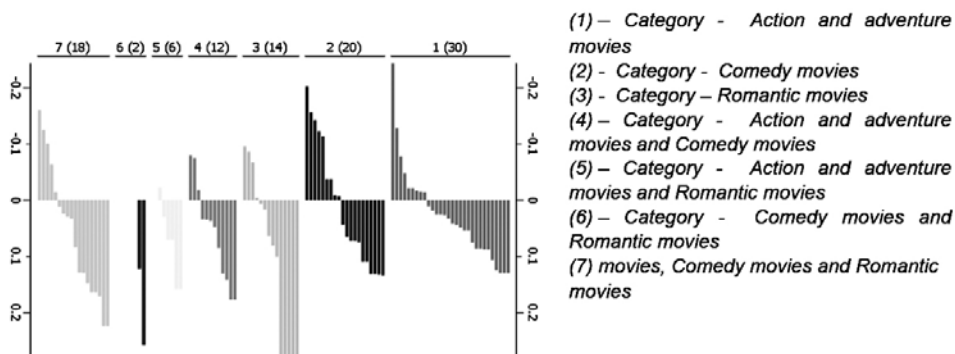


Figure 1: Different type of movies watched by youth

From the analysis using orange software by silhouette method, it helped identify the group most watched movies category type as shown above. Groups are categorized as below. According to the above data out of 102 people 66 of them are watching or interested in the action and adventure movies.

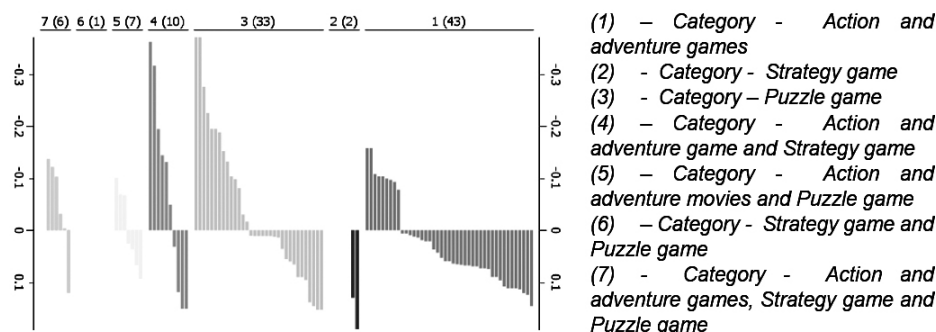


Figure 2: Diagram of numbers and their favourite video game category

Silhouette diagram shows clearly that most of youth interested in playing action and adventure video games from the data collected from the survey. Among those 102 youth 66 of them are interested or playing video games this clearly shows, that most of the youth are attracted toward the video games.

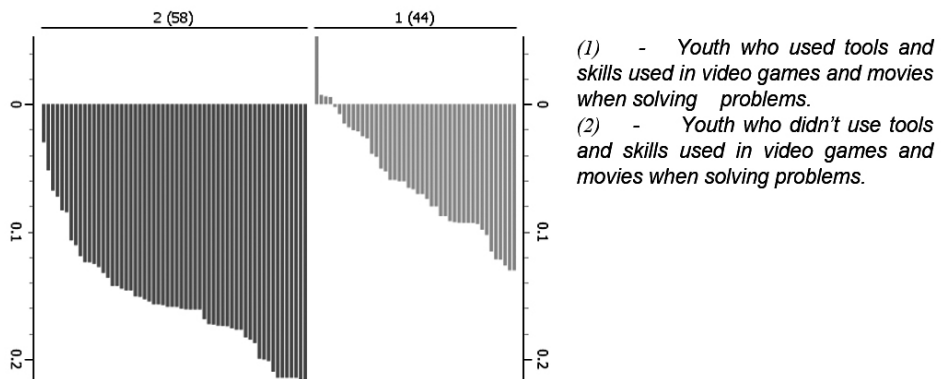


Figure 3: Relationship of video games and movies and tools and techniques

The above relationship shows range of youth who used tools and methods like in video games and movies while solving problem. Above graph clearly shows that out 102 youth people 44 of them have used or willing to use tools and skills used in movies and also 58 of them are not inserted in those tools and skills. though majority of them have not used but still there is a considerable number of people who used them in real life situation.

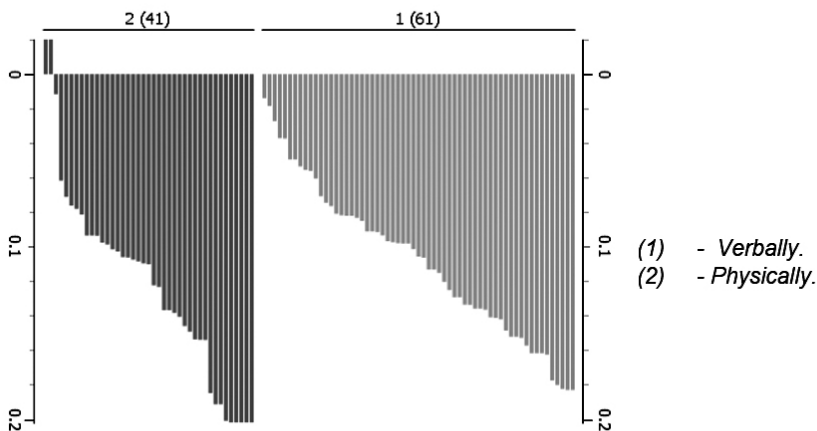


Figure 4: Method of fight used by youth

The above diagram highlights the way or method most of the youth got in to fight, the main two methods are shown above, 61 of the youth fight verbally and 41 of physically out 102. From this we can get an idea that most of the youth get in to fight physically because of aggressiveness they have developed within them through video games and movies.

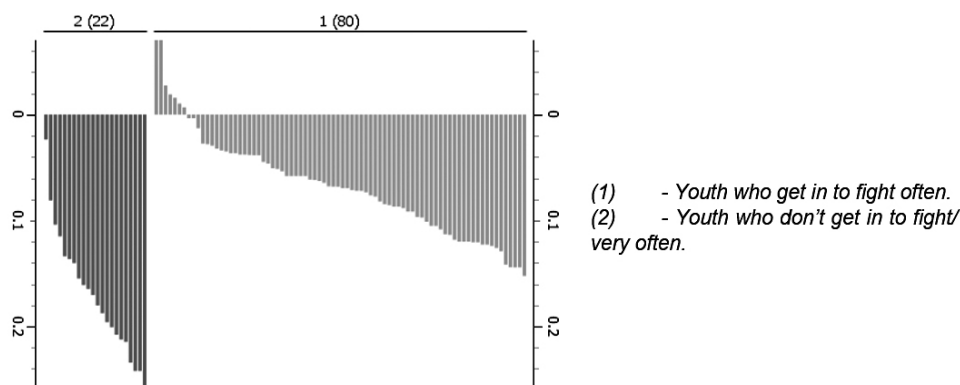


Figure 5: Youth who got in to fight

When we considering about the fights above diagram clearly highlights, majority of youth get in to fights often or they choose fighting as a problems solving method in their life. We can see clearly that 80 Of the youth have got in to fight for different reason and 22 of them have not, here we can assume that number of people who got in to fight in this period is because of their interest in Action and adventure games and movies.

After going through above facts to know whether they connect with each other their count was filtered through excel sheet and compared. According above finding there were some connection between those some of facts mentioned above. But there were no any co-relationships among them, the questions which had connection was filtered in the excel sheet to get clear knowledge about how it is related with each other. Some selected questions were compared with each other to calculate the percentage of impacts they have in behavior.

	Youth who play video games	Youth who play action and adventure games	Percentage
Age group (15-20),(21-25)	85	55	64.7%

	Youth who play video games	Youth who don't play action and adventure games	Percentage
Age group (15-20),(21-25)	85	30	35.2%

According the literature review the number of youth who got addicted to the video games between 14 – 24 age group has increased and also admitted to do various violent acts have increased in this time period. From the data collected by survey above fact was found that among 102 youth 85 of them play video games and in them 55 of them play action and adventure games and 30 of them don't play action or adventure games. This is a Clear proof that the above mentioned point in the literature review is truthful.

	Youth who play action and adventure games	Who use physical method to fight	Percentage
Age group (15-20),(21-25)	55	40	72.7%

	Youth who play action and adventure games	Who use to fight verbally	Percentage
Age group (15-20),(21-25)	55	15	27.2%

Among the above mentioned age group of youth who act violently or physically during a fight is 15 of them. As a percentage 20%, from this data we can assume that violent acts and physical movements in a fight encouraged by the Action and adventure video games.

Youth who watch movies	Youth interested in action and adventure movies	Percentage
102	66	64.7%

Among those youths who watch action and adventure movies.

	Youth who use tools and skills used in the movies to solve problem	Youth who don't use tools and skills used in the movies to solve problem
Youth interested in action and adventure movies (66)	31	35
Percentage	46.9%	53%

From the data above we can see that although there are some people who watch Action adventure movies but who don't use those experience in their real life to solve problems. But still there is considerable amount of youth who has used skill in tools used in violent movies in their real life when solving problem, this openly remark that Action and adventure movies do make an impact in their life when solving problems.

As of the literature review that they have found violent video games causes aggression using more than 134,000 and more data from people. Making this statement stronger the data collected through the survey done we were able find out similar relationship among youth who play action and adventure games and their behavior.

	Who behave aggressively when he/she get angry	Who show aggressive behavior when he/she get angry mostly (Sometimes)
Youth who play action and adventure games (66)	16	41
Percentage	24.2%	62.1%

Here we can see that though most of them are not sure how they behave when they get angry but still there is amount of people who are addicted to video games and also behave aggressively so that we can assume that above mentioned point in the literature review has a connection with the above data.

	Who don't behave aggressively when he/she get angry	Percentage
Youth who play action and adventure games (66)	9	13.6%

And people who play violent video games who don't show any aggressive behavior while they get angry in their day is very small amount of them, so it is crystal clear that people who are long time addict or who involve in violent video games show more aggressive behavior in their day to day life.

The above tables shows some good percentages of relationship with the selected question. By above fact that video games/ movies do make impacts in the behavior of youth when solving problem in their real life. Especially Action and adventure movies and games have more impacts in the behavior of youth.

Conclusion

The conclusion of this research is video games and movies have an impact on youth life when solving problems in particular the action and adventure movies and action and adventure game (violent) make a big impact on the way how they react to the problem. According to research people who involve above mentioned act do behave aggressively or act physically to solve a problem. People should be more alert toward issues like this and to avoid such impacts we should have balanced life with digital wellbeing.

References

Anon., 1961. UNESDOC Digital library. [Online]
Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000061213>
[Accessed 10 04 2020].

Husain, Z., 1994. identifying video game addiction in children and adolescence. sciencedirect, 19(19), pp. 543-553.

Maldonado, M., 2018. PsychCentral. [Online]
Available at: <http://www.childrens.com>
[Accessed 27 02 2020].

Md sallah hassan, M. n. o., 2009. Researchgate. [Online]
Available at: https://www.researchgate.net/publication/228612855_Effects_of_Watching_Violence_Movies_on_the_Attitudes_Concerning_Aggression_among_Middle_Schoolboys_13-17_years_old_at_International_Schools_in_Kuala
[Accessed 02 04 2020].

Ranna Cooper, Z., 2011. Michigan Youth Violence Pprevention Center. [Online]
Available at: <http://yvpc.sph.umich.edu>
[Accessed 02 27 2020].

Twenge, J. M., 2012. Psychology Today. [Online]
Available at: <http://www.psychologytoday.com>
[Accessed 28 02 2020].

Study on Involvement of Selfie Captures in Current Sri Lanka

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Abstract

Selfie captures has just begun but it has distributed rapidly to a greater extent. When one captures selfies without any self-satisfaction of him/her it could lead to a mentally affected person where he or she could commit suicide without self-satisfaction is known as dysmorphic disorder. This research was conducted to give awareness for people regarding To Identify the Involvement of selfie captures in the current society and to study the involvement of selfie captures and their behavior concern towards the selfie captures involvement. This was based on developing a webpage, with questionnaires and matching hints which directs the user to view more information regarding the captures of selfie, which can provide awareness for people regarding the impacts of selfie addiction, how to overcome such situations to reduce the selfie addiction and build a digital wellbeing among the people. Those questions were revealed as a survey to find the "Identify the Involvement of selfie captures in the current society" in the current society and the correlation between each of them were identified. Most of the variables had strong positive correlation, where both variables increase at same time and opposite of the variables have been to be consisting. Furthermore, questions and relevant hints were given in a webpage along with the statistical analysis of the sample data. This webpage would be useful for people to understand the selfie captures and their addictions behavior through the questionnaires, where they can evaluate their self-using the symptoms of selfie addiction. Moreover, this research reveals about the correlation between each question which are given in the questionnaire/webpage. Where the hints are given for each answer will help them to develop a digital well-being within their own belongings and the society.

Author Keywords

Selfie captures, awareness, addiction, involvement, symptoms, Impacts.

Introduction

The relationship with devices is more effective the development of mobile technology has played an important role in shaping the impact of social media. This means the connectivity of devices at anywhere anytime. Social media addiction is behavioral addiction that is defined by being overly concerned about social media, driven by uncontrollable urge to log on to use social media. People have the habit of scrolling and checking the regular update. This social media addiction does not look like a problematic issue where a less amount of people slightly moves onto a higher percentage and very few people addicted through selfie captures.

Selfie's are self-portrait taken to admire the unnecessary pride in one's own appearance. When these selfies are taken repeatedly in increased numbers with useless efforts to stop taking them is called as "SELFIE ADDICTION". Over a period of time, technological

advancement has given us a new Addiction Disorder. Selfie is a photo of yourself that one take, typically with a Smartphone/webcam. Smartphone has intruded in our life so much that without which we cannot survive. Selfies are self-portrayed photos that one human takes photos of their own when this condition is not being able to control leads to the worst condition where sometimes it could even leads to deaths and cause to body dysmorphic disorder. Selfitis is observed in various stages as borderline, acute, and chronic.

According the data it has been identified at first they are not identified as selfitis whereas day by day people tend to be addicted from minor symptoms at first and foremost starting period of being an selfitis may be not known and when comparing their behavior and lifestyle towards them change considerably towards the social media and leads to mentally affected.

Methodology

This research is conducted in the form of secondary source data collection. Each data is analyzed according to the topic from the data's that was collected.

Data collection

The Data collection is obtained from the secondary source search like goggle scholar where most of web pages had vivid explanation and clear explanation on the topic "How selfie addiction effects for the imbalance of mental health."

The data was able to derive from these sites were the main areas like how many people are more likely towards the selfie captures, what number of snapshots they capture which had many other positive aspects which led to conduct the research with clear defined data sources.

Process

The above-mentioned data collection was further extended and elaborated as many sub parts where the data process had many sub parts as;

The topic was first researched through by reading many digital wellbeing research papers and then an article had an impact on capturing selfies was considered has an disorder and then many researches had the same cause and certain researches had many solutions to those research papers.

• Analysis by survey

After the confirmation of the topic I collected the same mental status of selfie addiction of people summarized them into many sub parts and briefly elaborated them into various category and then started to find the reasons of each of the problem which I identified. As the next step I break down each step and then I created my own questions for the problems, Further the questions were extended as survey collected from secondary sources analysis by the survey where the questions were responded through online in google forms the google forms had many responded answers where some matched my research and where some didn't match the answers of which the exact question had moreover people spend less time on reading research papers.

• Website development

When it comes to any causes to identify where to give a brief idea on how To Identify the Involvement of Selfie Captures in the Current society. where we identified this would be beneficial to the readers to make awareness on selfie captures I developed a webpage where the first page is a detailed information on what is selfie captures and what type of disorder it is and vice versa in order to test the addiction level of an infected person through selfie captures there are some test cases displayed with relevant research papers perspectives known as hints where the user will be able to gather more facts about the involvement of selfie captures and overcome the addiction level of the selfitis where symptoms are identified.

Experiment

The result obtained from this Primary survey is as below;

1. Basic selfie captures

- Four to five selfies a day but not posting them on social media, consider yourself borderline.
- least three images of yourself a day, that's is known as "acute syndrome"
- Having uncontrollable urge to take and post up to six photos a day is known as "chronic Ifitis".

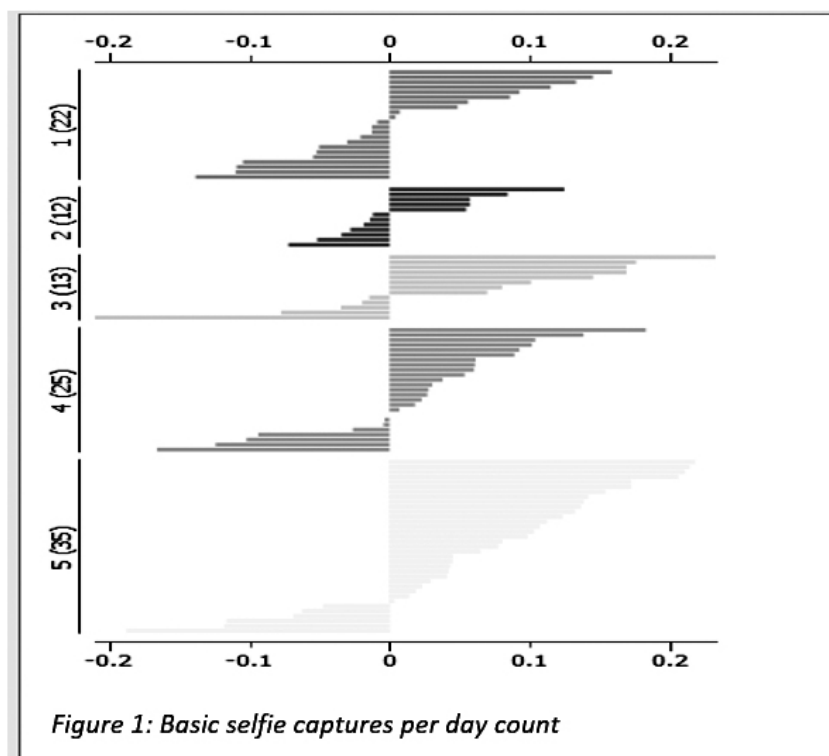


Figure 1: Basic selfie captures per day count

Category	label	Frequency	Percentage
4-5 per day	1	22	20%
10-12 per day	2	12	11%
2-3hours continuously	3	13	12%
3-5 per week	4	25	23%

According to the secondary research it is being identified that 4-5 captures is considered as the basic selfie captures beyond the basic level this is a mild symptom of being addicted, and it is been identified that people have been taking 2-3 hours continuously were the people who belong to this category are possible of being “selfitis” which is known as extreme level selfie captures addiction syndrome.

From the collected responses it is being identified in the process of $22/107 \times 100$ gives that 20% of responses were obtained from the basic selfie captures of 4-5 per day and 11% were obtained from the 10-12 captures per day and people had an increment on capturing selfies where they have been taken selfies 2-3 hours continuously and 12% has been derived and 3-5 per week captures has obtained 23% and it could be stated as that people take more captures in the range of week.

Basic selfie captures 4-5 per day and the relationship between the marital status

Category (Marital status)	Matched concept	Frequency	Percentage
Married	Basic-selfie-captures 4-5 per day	4	3%
Single	Basic-selfie-captures 4-5 per day	12	11%
Relationship	Basic-selfie-captures 4-5 per day	5	4%
other	Basic-selfie-captures 4-5 per day	1	1%
	Total	22	20%

According to the secondary data collected it has found that selfie addicted people get 4-5 photos per day according to the above tables the table 1 shows 20% selfie captured in the basic selfie captures of 4-5 per day out of the 20% the more amount of selfies are captured who belongs to the marital-status as single.

Basic selfie captures 10-12 per day and the relationship between the marital statuses

Category(Marital status)	Matched concept	Frequency	Percentage
Married	Basic-selfie-captures 10-12 per day	3	2%
Single	Basic-selfie-captures 10-12per day	2	1%
Relationship	Basic-selfie-captures 10-12 per day	5	4%
other	Basic-selfie-captures 10-12 per day	2	1%
	Total	12	8%

According to table it shows that 11% of selfie captured photos are taken under the category of 10-12 per day where according to this table it proves that more number of selfies are taken by people who are in a relationship.

Basic selfie captures 2-3 hours continuously and the relationship between the marital statuses

Category (Marital status)	Matched concept	Frequency	Percentage
Married	Basic-selfie-captures 2-3 hours continuously	2	1%
Single	Basic-selfie-captures 2-3 hours continuously	4	3%
Relationship	Basic-selfie-captures 2-3 hours continuously	7	6%
	Total	13	12%

According to the table it states that 12% of people are capturing photos 2-3hours continuously and here too more number of selfies are captured by the people who are in relationship.

Basic selfie captures 4-5 per day and the relationship between the duration of posting captures

Category (Marital status)	Matched concept	Frequency	Percentage
Everyday	Basic-selfie-captures 4-5 per day	4	3%
2-3 times frequently	Basic-selfie-captures 4-5 per day	11	10%
Not frequently	Basic-selfie-captures 4-5 per day	7	6%
	Total	22	20%

According the above result it states that the people who have the basic captures of selfies are posting the captured selfies at what range of time period is indicated while the posting of captured selfie according to the table1 4-5 per day the highest value of the range relies on the 10% where the people post captures frequently 2-3 in a week.

Basic selfie captures 10-12 per day and the relationship between the duration of posting captures

Category (Posting _captures)	Matched concept	Frequency	Percentage
Everyday	Basic-selfie-captures 10-12 per day	4	3%
2-3 times frequently	Basic-selfie-captures 10-12 per day	3	2%
Not frequently	Basic-selfie-captures 10-12 per day	5	4%
	Total	12	8%

According to table category as 10-12 per day has a range on highest value of 4% on people who do not post captures frequently.

Basic selfie captures 2-3 hours continuously and the relationship between the duration of posting captures

Category (Posting _captures)	Matched concept	Frequency	Percentage
Everyday	Basic-selfie-captures 2-3 hours continuously	3	2%
2-3 times frequently	Basic-selfie-captures 2-3 hours continuously	5	4%
Not frequently	Basic-selfie-captures 2-3 hours continuously	5	4%
	Total	13	10%

According to the above table who capture at 2-3 hours fall under the category of they too post captures 2-3 times frequently and do not post captures.

Basic selfie captures 4-5 per day and the relationship between the main reason for posting the captured selfies

Category (Main reason)	Matched concept	Frequency	Percentage
Share among friends	Basic-selfie-captures 4-5 per day	5	4%
Share the current lifestyle	Basic-selfie-captures 4-5 per day	6	5%
Because he/ she is bored	Basic-selfie-captures 4-5 per day	1	0.9%
Other reasons	Basic-selfie-captures 4-5 per day	10	9%
	Total	22	19%

According to the data collected it states that the relationship that relies among the basic selfie captures and main reason for capturing the selfies in the range of 4-5 per day is indicated in table 1 has the range of 20% out of that the main reason was to share the current lifestyle and some had the more in number is for other reasons.

Basic selfie captures 10-12 per day and the relationship between the main reasons for posting the captured selfies

Category (Main reason)	Matched concept	Frequency (12)	Percentage
Share among friends	Basic-selfie-captures 2-3 hours continuously	5	4%
Share the current lifestyle	Basic-selfie-captures 2-3 hours continuously	5	4%
Because he/ she is bored	Basic-selfie-captures 2-3 hours continuously	2	1%
Other reasons	Basic-selfie-captures 2-3 hours continuously	-	-

According to the table which has the range of 10-12 per day selfies has the value of 11% where out of that the same number of percentage value matched with the main reason as share among friends and the current lifestyle.

Basic selfie captures 2-3 hours continuously and the relationship between the main reasons for posting the captured selfies

Category (Main reason)	Matched concept	Frequency (13)	Percentage
Share among friends	Basic-selfie-captures 4-5 per day	4	3%
Share the current lifestyle	Basic-selfie-captures 4-5 per day	6	5%
Because he/ she is bored	Basic-selfie-captures 4-5 per day	2	1%
Other reasons	Basic-selfie-captures 4-5 per day	1	0.9%

The table shows that the basic selfie captures of 2-3 hours continuously states that they have been posting captures to share the current lifestyle. Less number of values are obtained for bored people when comparing all the three tables has a small percentage when compared to all three tables.

Basic selfie captures 4-5 per day and the relationship between the mental status for posting the captured selfies

Category (Mental status)	Matched concept	Frequency (22)	Percentage
Loneliness	Basic-selfie-captures 4-5 per day	3	2%
Friendly	Basic-selfie-captures 4-5 per day	12	11%
Pleasant speaker	Basic-selfie-captures 4-5 per day	5	4%
Negative thinker	Basic-selfie-captures 4-5 per day	2	1%
Total		22	18%

Basic selfie captures 10-12 per day and the relationship between the mental status for posting the captured selfies

Category (Mental status)	Matched concept	Frequency (12)	Percentage
Loneliness	Basic-selfie-captures 10-12 per day	1	0.9%
Friendly	Basic-selfie-captures 10-12 per day	6	5%
Pleasant speaker	Basic-selfie-captures 10-12 per day	3	2%
Negative thinker	Basic-selfie-captures 10-12 per day	2	1%

Basic selfie captures 2-3 hours continuously and the relationship between the mental status for posting the captured selfies

Category (Mental status)	Matched concept	Frequency (13)	Percentage
Loneliness	Basic-selfie-captures 2-3 hours continuously	3	2%
Friendly	Basic-selfie-captures 2-3 hours continuously	7	6%
Pleasant speaker	Basic-selfie-captures 2-3 hours continuously	3	2%
Negative thinker	Basic-selfie-captures 2-3 hours continuously	-	-

According to the above tables its states that there is a mental status prevailing among the basic selfie captures and moreover all three tables states that they are in a friendly mental status when they are with some people so there is less possibility of feeling loneliness which is stated according to the secondary research and where it is the state that the addiction syndrome can be identified.

Summary of the above tables

	Variable(Basic selfie captures)	Result (Percentage in total values)
No of basic selfie captures	1,2,3	43%
Marital status	1,2,3	32%
Posting captures	1,2,3	38%
Main reasons	1,2,3	38%
Mental status	1,2,3	32%

The above tables illustrate each and every prevailing situations of selfie captures, and its addiction causes compared in each instances and there are people with addiction symptoms fairly and where some have no symptoms of addiction.

Conclusion

A study is conducted in the involvement on how to identify the Involvement of Selfie Captures in The Current society through this research. In order develop awareness of “how to Identify the Involvement of Selfie Captures in The Current society” and maintain a digital wellbeing in selfie addiction, and vice versa a webpage is developed in providing a detailed information to the people using the detections done through the secondary survey. This webpage apparently helps to develop the digital wellbeing among the community.

References

- Addiction Center. (2020). Social Media Addiction - Addiction Center. [online] Available at: <https://www.addictioncenter.com/drugs/social-media-addiction/> [Accessed 2 Jan. 2020].
- Courtyard, N. and Ogden, J. (2020). The impact of posting selfies and gaining feedback ('likes') on the psychological wellbeing of 16-25 year old: An experimental study. [online] Cyberpsychology.eu. Available at: <https://cyberpsychology.eu/article/view/10788/9699> [Accessed 2 Jan. 2020].
- Lifehack. (2020). Addiction To Selfies: A Mental Disorder?. [online] Available at: <https://www.lifehack.org/articles/communication/addiction-selfies-mental-disorder.html> [Accessed 2 Jan. 2020].
- Taylor & Francis. (2020). Notes to self: the visual culture of selfies in the age of social media. [online] Available at: <https://www.tandfonline.com/doi/abs/10.1080/10253866.2015.1052967> [Accessed 2 Jan. 2020].

A brief note on green cloud computing

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Abstract

Global warming and environmental pollution have created increased awareness on the utilization of green energy practices such as renewable energy as much as possible to reduce the emission of Carbon Dioxide (CO₂) in the air. As such with the increased use and adoption of Cloud Computing has led to the concern of adopting green energy practices. Therefore, the green cloud computing focuses on the study and design of producing energy efficient ways which are less impactful to the environment. The reviewed literatures suggest that the IT industry produces over 2% CO₂ emission which is similar to the emission by aviation industry and it is growing at the rate of 6% where it is expected to be emitting 12% by year 2020. Further the concept of green energy and models proposed to address energy consumption on cloud computing are highlighted. The finding suggests that the concept of green cloud computing is novel in local context. Therefore, research have to be conducted in order to adopt energy efficient practices in the utilization of technologies in general and cloud computing in particular.

Keywords

Cloud Computing, Green Cloud Computing, CO₂ Emission, Green Technologies, Renewable Energy

Introduction

Cloud Computing is defined as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. Networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction as per the definition provided by National Institute of Standards and Technology (NIST) (Mell, 2011). At present, Cloud Service has three core service models such as Infrastructure as a Service (IaaS), Software as a Service (SaaS) and Platform as a Service (PaaS). Further, the cloud service models are deployed by service vendors in following ways, such as, Private Cloud, Public Cloud and Hybrid Cloud where hybrid cloud is the use of the combination of private and public cloud. Cloud computing also includes five actors that fulfill the cycle of cloud computing from service provider to client. It includes Cloud Consumer and Cloud Provider. Cloud Career, Auditor and Broker are the other actors that make up the cycle of cloud computing a reality (Samizadeh, 2017). In the model of Infrastructure as a Service, cloud consumers rent infrastructure from cloud providers. The service may range from data centers which is in fact a set of physical machine or collection of machines with each having their own resources such as CPU, RAM, network, bandwidth, storage etc. However, the increased use of cloud computing adoption has led to the concern of increased emission of Carbon Dioxide to the environment.

Literature Review on Green Cloud Computing

At present, global warming has become a key concern that has created increased awareness and concerns on issues related to the environment, air pollution etc. In this aspect, the use of cloud computing also has raised concerns over environmental pollution through the emittance of tons of Carbon Dioxide to the environment. As per the study by Gartner, the IT Industry produces 2 percent of CO₂ emission which is similar to that of the aviation industry has been producing to the environment (Khosravi, 2013). The number is ever increasing, and it sits somewhere around at the rate of 6 percent per year and predicted to be emitting 12 percent of CO₂ to the environment by 2020 (Uddin, 2012). EPA report on U.S notes that datacenters consume 1.5 of total energy consumption in U.S and costs 4.5 billion dollars each year (S.Jing, 2013).

In addition, several studies have been conducted to study and propose metrics to reduce the energy consumptions and increase green cloud computing. In 2011, Si-Yuan Jing et al (S.Jing, 2013) studied the issue of the status of green cloud computing and proposed techniques and studies that had been done in energy aware technologies at different levels such as server, network, processors, storage, cooling equipment etc. In this study, the researchers have proposed a three-step model where they emphasized on hardware and software that do not need hardware change and redesign. Mueen Uddin et al (Uddin, 2012) has proposed a framework that consist of five steps. This proposal can be used to utilize green standards to measure the efficiency of data centers. In another study, Saurbh kumar garg and et al, have proposed a framework called carbon-aware green framework which addresses the problems associated with the environment with the aim to reduce carbon footprint by the operation of cloud computing.

Discussion

Environmental issues and natural disasters are increasing in several ways that the world is struggling to address. While the technology has brought so many advantages to upgrade the living standards so does it is has brought new threats to the environment. Therefore, while adopting to technologies that are beneficial and cost effective, it is also important to have concerns on its negative impact on environment and other aspects that would create undesired climate for the living creatures. As such in this review, attempts were made to create awareness about cloud computing, the concept of green energy and the models proposed by researchers to measure and monitor the emissions of CO₂ in the use of cloud computing.

In addition, it was evident that the concept of green cloud computing is at the development stage in general and to be precise, literature is very limited for the green cloud computing in local context that too with a limited extend. Therefore, academics and researchers may focus this emerging area to study and propose a suitable working model of green cloud computing adoption which are less likely to create CO₂ emission.

References

Khosravi, A., 2013. Energy and Carbon-Efficient Placement of Virtual Machines in Distributed Cloud Data Centers. *Parallel Processing*, Springer Berlin Heidelberg, pp. 317-328.

Mell, P., 2011. The NIST Definition of Cloud Computing, Gaithersburg: National Institute of Standards and Definitions.

S.Jing, S. S., 2013. State-of-the-art research study for green cloud. *The Journal of Supercomputing*, 65(1), p. 445–468.

Samizadeh, T., 2017. Toward Green Cloud Computing: A Review. *International Journal of Computer Science and Information Security*, 15(1).

Uddin, M., 2012. Energy efficiency and low carbon enabler green IT framework for data centers considering green metrics. *Renewable and Sustainable Energy Reviews*, 16(6), p. 4078–4094.

Impact of Computer Technology on Health: Assessing the Risk Factors for Computer Vision Syndrome Among Computer Users

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Abstract

The computer is one of the most common office tools used in various companies. Prolonged use of the computer video display terminal (VDT) has led to increased health risk for users with computer vision syndrome (CVS). CVS is a type of vision and eye problem associated with computer use. Individuals involved in the process of using computer technology have become dangerous in digital well-being. The main purpose of this research is to identify CVS symptoms and identify factors that contribute to CVS in those who work prolong hours on the computer. Data required for research were collected using primary and secondary methods. After conducting the research showing that continuous computer uses for more than 3 hours and Wrong computer posture causes CVS symptoms, the fact was analyzed and finalized.

Key words

Computer vision syndrome | Video display terminal |Prolong | Symptom | Digital well-being

Introduction

The use of the computer in every workplace has made life easier and greatly increased output. The computer has become almost an indispensable tool in the office and at home. Especially Developers, programmers, and computer screens have a perennial relationship. It has become a necessity in the 21st century. working more than 3 hours continuously on computers can lead to vision problems known as CVS.

Recent studies found that computer screens affect eyesight. The truth is, there is no good evidence that looking at the system causes permanent eye damage. However, computers can cause many eye-related symptoms. The Main Focus of this research paper is to identify CVS symptoms and to identify factors that contribute to CVS in those who work prolong hours on the computer with to that make an awareness among the society about the effects of prolong computer use.

Therefore, hope this research will provide a clear idea about CVS and give awareness among computer users about computer vision syndrome. This will be helping users to reduce computer vision syndrome and build digital wellbeing among them.

Methodology

This paper uses Both Primary and secondary research for finding facts. Secondary data was used to get more idea related to CVS and the connection between the prolong

computer users through literature review.

In literature review existing researches, report related to the topic was studied to develop question needed for the survey. The primary data collection was done to collect the data required for analysis through a survey containing a set of questions obtained from the study. The survey was created using the Google form and the link was shared among computer users via a social media site. Two hundred people participated in the survey. Orange software (silhouette plot) was used to clearly identify how selected facts of question affect the prolonged computer user.

Experimental

Result was obtained using the analysis done as below. The following concept was used for the result and discussion.

(1) Compute Using Hours

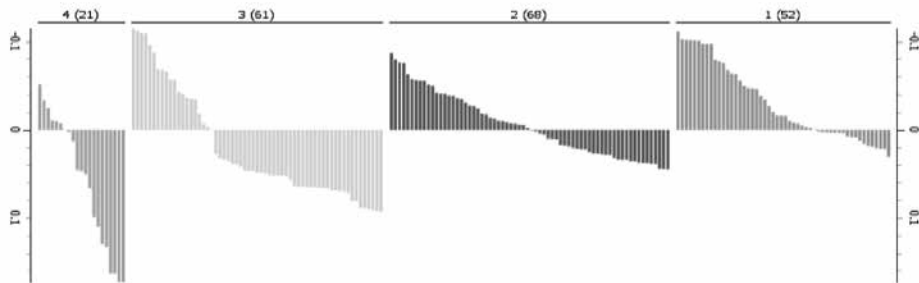


Figure 1 computer using hours

This helped to identify the time to use the computer consistently for a day. although most of them use the computer continuously for more than 3 hours, there are a significant number of people who use the computer for less than 2 hours as shown above.

(2) CVS Symptoms user had after using a computer for more than 3 hours continuously

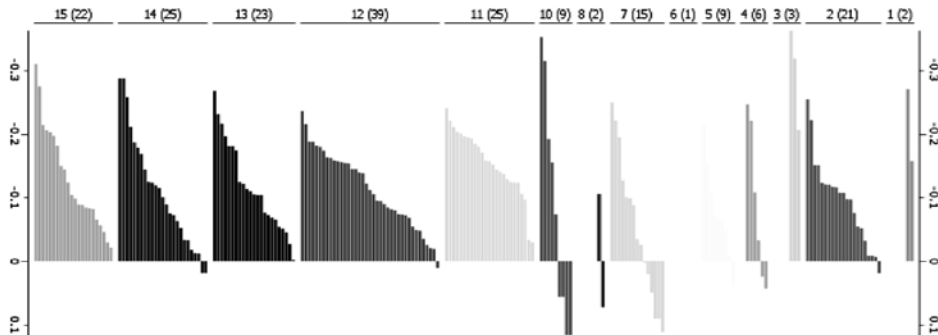


Figure 2 CVS Symptoms user had after using a computer for more than 3 hours continuously

Although most of them had symptoms were had headache, neck and shoulders pain; eyes strained, eyes dry, Excessive tearing after using a computer for prolonged continuously.

(3) Factors contributing to CVS.

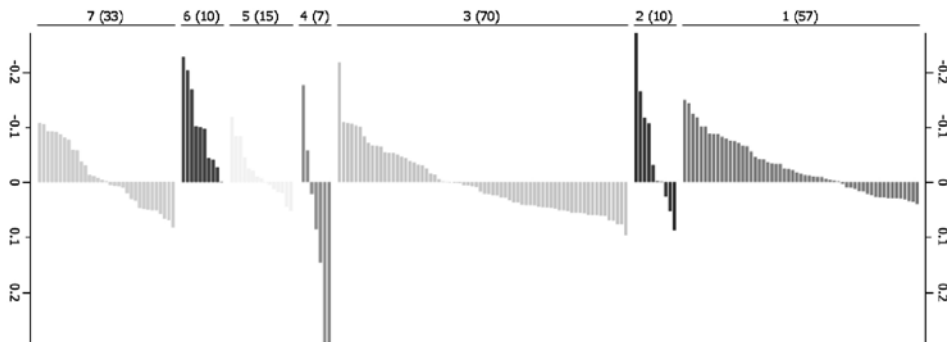


Figure 3 contributing factors to CVS

As shown above, most of them have choose the computer glare is too bright, computer station set up all wrong (wrong posture).

(7) Rang of taking screen breaks during work hours

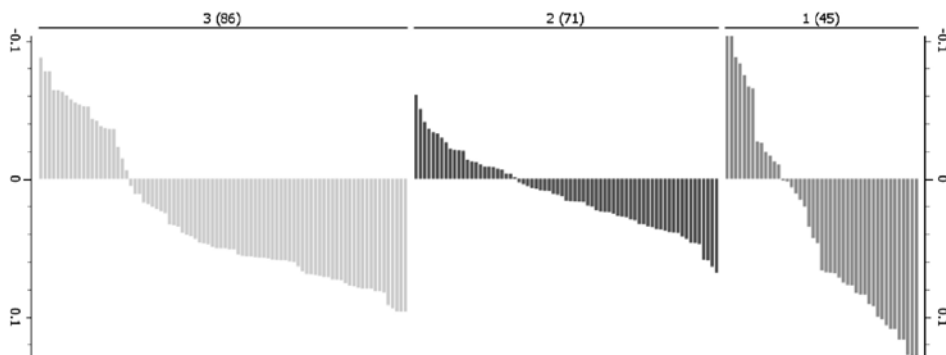


Figure 4 Rang of taking screen breaks during work hours

The above relationship helps to identify range of taking screen breaks during work. 71 Out of 204 not taking break, 86 take break sometimes.

	Symptoms that users had after using a computer for more than 3 hours continuously	Symptoms that users not had after using a computer for more than 3 hours continuously
Computer users who using the system for more than 3 hours. 151	111	5
Percentage	74%	3.31%

According the literature review, Vision Syndrome is caused that people who are using a computer for more than 3 hours per day continuously, From the data collected by survey above fact was found that among, 74% of participants had CVS symptoms, They use the computer for more than 3 hours a day.3% of them are not having the symptoms even after using the computer more than 3 hours continuously. This is a Clear proof that the above-mentioned point in the literature review is truthful.

Questions compared	Symptoms that user had after using a computer for more than 3 hours continuously	Contributing factors to symptoms that come out from users	Percentage
Count of people involved	131	118	90%

According the literature review, CVS is caused, Duration of computer usage, poor lighting, glare, screen brightness, and improper workstation setup are risk factors for CVS. From the data collected fact was found 90% of participants had CVS symptoms Were identified from contributing factors. so that can assume that above mentioned point in the literature review has a connection with the above data.

	Symptoms that users had after using a computer for more than 3 hours continuously	Symptoms that users not had after using a computer for more than 3 hours continuously
Wrong posture users 114	76	15
Percentage	67%	13%

From the data collected 67% of users were identified with CVS symptoms, but 13% of patients had no symptoms, which may be due to the use of computers with frequent intervals. However, can assume that the above-mentioned point in the literature review has a connection with the above data.

	User Who doesn't take frequent screen breaks	User who take frequent screen breaks
Symptoms that users had after using a computer for more than 3 hours continuously. ¹³¹	71	28
Percentage	54.19%	21.3%

According to the collected secondary data, Short frequent breaks are recommended. From the collected response, fact was found 54.19% of participants are caused by CVS symptoms. This is a Clear proof that the above-mentioned point in the literature review is truthful.

Discussion & Conclusion

The illustration and tables above show some good percentages of the relationship with the selected question. People with prolonged use of the computer have CVS symptoms (74%). Risk factors such as glare, poor lighting, and improper workstation settings show a clear view of the effects of over 3 hours of use (90%), computer users had CVS symptoms due to incorrect posture (67%) and frequent screen breaks Users who did not take also had symptoms (54.19%). Over time computer users will have an impact on the health of computer technology. Therefore, computer users often need to have a short break and can reduce CVS disease by consuming omega-3 fats and maintaining proper posture by wearing computer glasses (UV cut) while using the computer. Also, other factors contributing to CVS should be considered when using the system.

The web page was built to give an introduction to CVS and its effects, awareness in the long-term computer user community so that visitors can learn about some of the real-time experiences of people affected by the situation and participate in the survey to learn about their situation. That website provides some tips that will help the reader get an idea about the problem. We need to have a balanced life with digital wellbeing to avoid such vulnerabilities.

Future improvements

As a future improvement, it is possible to create a database on the webpage that will store the data received from users through the questionnaires on the webpage. Currently, only warnings are issued to users browsing the web, which does not provide any predictions about the impact of CVS. The AI model sensor system is made so that it will automatically scan our eyes and reduce the power of the screen, and must be trained through a real-world database that can be collected from experts such as doctors. This improvement will be implemented with the modified webpage.

References

(Centre, Apr – June 2013) (Kaushik, 2017) (Eldridge, 2015) (prasad, 2016) (chulongmin, 2019) (Subhalakshmi, 2017) (Anon., 2017) (Dr. Tammy Vo, n.d.) (Anon., 2015) (Anon., n.d.) (Guleria, 2019) (Abiy Maru Alemayehu, 2019) (Randolph, 2017) (Anon., 2019; Ume Sughra, 2019) (Yin, 2008) (Bhargava, 2016)

Abiy Maru Alemayehu, D. o. O. U. o. G. G. E., 2019. Pathophysiologic Mechanisms of Computer Vision Syndrome and its Prevention. World Journal of Ophthalmology & Vision Research (WJOVR), 2(5).

Anon., 2019. viewsonic. [Online] Available at: <https://www.viewsonic.com/library/business/best-computer-screen-positioning/>

Centre, 1. M. C. H. & R., Apr – June 2013 . PRACTICE OF ERGONOMIC PRINCIPLES AND COMPUTER. NATIONAL JOURNAL OF MEDICAL RESEARCH , 3(2), p. 115.

Disanayaka, N., 2018. Dailymirror.lk. [Online] Available at: <http://www.dailymirror.lk/article/computer-vision-syndrome-ruins-your-vision--148369.html> [Accessed 21 02 2020].

Kaushik, V., 2017. Computer Vision Syndrome (CVS): Recognition and Control in Software Professionals. Journal of Human Ecology, 60(2-3), pp. 67-69.

Randolph, S. A., 2017. Computer Vision Syndrome. sagepubjournals, 65(7), pp. 328-328.

Ume Sughra, W. A. K., 2019. Prevalence of Computer Vision Syndrome (CVS) Symptoms and Its Awareness Among Software Engineering Students of Twin Cities. 11.

non., 2015 . ymptoms Of And Solutions For Computer Vision Syndrome. [Online] Available at: <https://www.vspdirect.com/vision-hub/symptoms-and-solutions-computer-vision-syndrome> [Accessed 29 03 2020].

Anon., 2017. -mission.org. [Online] Available at: <https://medium.com/the-mission/digital-eye-strain-is-destroying-your-eyes-4ac7f8e87b24> [Accessed 28 03 2020].

Anon., n.d. Computer Vision Syndrome (Digital Eye Strain), s.l.: The Canadian Association of Optometrists.

chulongmin, 2019. Tiger: Wearable Glasses for the 20-20-20 Rule to Alleviate Computer Vision Syndrome. 10, pp. 1-11.

Dr. Tammy Vo, O., n.d. Computer Vision Syndrome and Neurolens, Suite 104, Austin: Look + See Vision Care.

Eldridge, M., 2015. safetyglassesusa. [Online]
Available at: <https://blog.safetyglassesusa.com/reducing-glare-as-a-workplace-safety-hazard/> [Accessed 28 02 2020].

Guleria, A. S., 2019. Saving Children From Digital Vision Syndrome, Kajri : s.n.

prasad, 2016. Computer vision syndrome among computer office workers in a developing countr. 09 03.

Subhalakshmi, 2017. A study of carpal tunnel syndrome and computer vision syndrome among regular computer users and effect of yogic exercises in them. 27 06.

Anon., 2015. symptoms Of and Solutions for Computer Vision Syndrome. [Online]
Available at: <https://www.vspdirect.com/vision-hub/symptoms-and-solutions-computer-visionsyndrome> [Accessed 29 03 2020].

Anon., n.d. Computer Vision Syndrome (Digital Eye Strain), s.l.: The Canadian Association of Optometrists

Author links open overlay panelBiljanaMiljanovićMD, M. M. M. M. A. A., March 2007, thevisioncouncil. American Journal of Ophthalmology, 143(Issue 3), pp. Pages 409-415..

David E. Wang, j. D. A. W., 2013. effect of using desktop vision syndrome. In: ocular Surface Disorders. panama. new Delhi: Geoff Greenwood, pp. 131-394.

Dissanayake, N., 2018. Dailymirror.lk. [Online] Available at: <http://www.dailymirror.lk/article/computervision-syndrome-ruins-your-vision--148369.html> [Accessed 21 02 2020]

Faculdade de Medicina Da Universidade de São Paulo, S. P. B., 2014. Occupational and environmental medicine. BMJ, 23 06, Volume 71(Suppl 1), pp. 71, Issue Suppl 1

Guleria, A. S., 2019. Saving Children from Digital Vision Syndrome, Kajri: s.n

Harris, K., 2019. avogel. [Online] Available at: <https://www.avogel.co.uk/health/eyes/good-foods-for-eyehealth/> [Accessed 10 04 2020].

Wimalasunderas, S., 2006. Computer vision syndrome: a review. 01 09, pp. 21-29

Yin, A. P. D. L. K., 2008. Understanding and Preventing Computer Vision Syndrome. PMC Journals, Volume 1, p. 128–130...

Bhargava, R., 2016. Short-Term Omega 3 Fatty Acids Treatment for Dry Eye in Young and Middle-Aged Visual Display Terminal Users. National Library of medicine, 42(4), pp. 231-6..

Health effects of cellphone radiation on human brain

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Abstract

Since cellphone become a vital device in the global modern society, according to world health organization (WHO) some disease rates are on the rise. Various studies indicate that the emissions from a cell phone can be extremely harmful; especially to the human brain such as tumors, memory loss, and many other health hazards. Because cell phones radiation can be absorbed by tissues closest to where the phone is kept. This paper presents various factors of brain issues due to radio frequency waves in order to study about the current environment exposures to human being to the mobile phone, identify the harmful effects of the radiation and increase the awareness of harmful effects. In this paper, it has been discussed the intangible consistent result of analysis based on substantial review on different published research's on effects of mobile phone radiation towards long term users which gathered from the survey. Sample size a group of people are chosen out of large number and is asked question in order to get information about the large group. Then a website with multiple choice questions and hints has created to gather data from the pool. Hints lead participants to relevant research articles that already done by the researchers. The data was then analyzed using statistical software Orange to test casual relationships between variables. According to the analysis data majority participant has not followed the proper method when they are making direct calls. Even they have not followed the majority people have not experience headache. As the secondary identified the headache is the primary symptom of many people before they faced the other health hazard, in our pool the majority people have not experienced such a thing even they don't follow proper method. But it does not mean we are free from the bad effects of cellphone radiation.

Author Keywords

Cellphone radiation, human brain, health issues, symptoms

Introduction

In many countries, over half of the population use mobile phones and the mobile phone market is growing rapidly. According to the statistics approximately there are 27.38 million mobile phone connections in Sri Lanka (soravjain.com, 2018).

Mobile phones emit low level radiofrequency energy which is a form of non-ionizing electromagnetic radiation. This radiation can be absorbed by human body tissues that close to the phone. This depend on the distance between the mobile phone and the user, the technology of mobile phone and the user's distance from cell phone towers. Human brain cells communicate via electrical impulses, which can be detected by non-invasive EEG (Electroencephalography) measurements. According to the World Health Organization (WHO) classifies cell phone radiation as a "possible human carcinogen" due to an increased risk of brain cancer from long-term and heavy use of cell phones. Apart from that the other side effects of cell phone radiation are shortness of temper, headache, effects of learning, memory and hearing issues, depression, ear damage,

sleep disorder, lower sperm count, acoustic nerve and salivary glands, brain issues such as glioma. This study focuses on health effect of cellphone radiation on human brain.

Methodology

This paper was prepared based on thorough literature review and extensive consultation process. Consultations involved many experts in the field, interested organizations and individuals, a wide range of researchers and colleagues. All ideas gained from the literature gathered and summarized. The experiment was done using selective questionnaire which helps to analyze the level of health effects of cellphone radiation of human brain.

Data Collection

• Secondary data

Since this survey based on secondary research, most of data were collected from online articles and research which has done previously. All the questions are created by using secondary data.

• Primary data

Sample size a group of people are chosen out of large number and is asked question in order to get information about the large group. The survey consists of 18 multiple choice. The aim was to conduct the survey is to identify the level of risk of people who participates in this survey in percentage. Data were collected through google form which has stored in spreadsheet. Participants were given enough time to fill in the survey anonymously. The target population of this study was 105.

Process

• Data Analysis

Before analysis the gathered data was prepared. The dataset was checked for missing data and outliers. All values outside the calculated range were considered outliers. The outliers of this survey will be used to implement this survey to next level after sometimes. The data was then analyzed using statistical software Orange. Raw data-based experiments can't always accurately simulate real-life situation and behaviors, but they are effective for tasting casual relationships between variables.

• Implementation of Website

A website with multiple-choice questions were created in order to do this survey which created by HTML and customized with bootstrap and CSS. This website built to show hints with respective links when a participant fills this question. This links shows the relevant research articles that already done by the researchers.

Experiment

In this Chapter, all the experimental results of cellphone radiation on human brain outlined and presented and examined in detail. In order to analyze I have used orange tool. The following table shows the age group and period of mobile usage of participant

and how they denoted in the graphs.

Mobile phone use period of participants

According to the analysis of gathered data, people most who participated to this survey are in the age group 21 to 30.

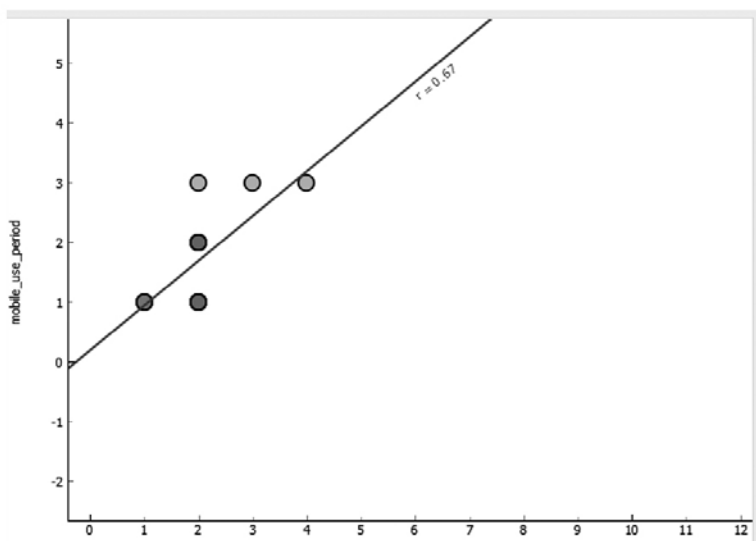


Figure 1: Age group vs mobile use period

The above diagram is shown the certain period of mobile use of people who are between the age range of 11 to 70. People who belong to age range 21-40 are use most than the other age group of people. Age group 21-30 people are use mobile phone 10 years on average which is quite high range compare to other age group people.

Age Group	Denote by
11-20	1
21-30	2
31-40	3
41-50	4
51-60	5
61-70	6
Above 70	7

Period of Mobile usage	Denote by
Less than 5 years	1
Between 5 – 10 years	2
Between 10 – 20 years	3
More than 20 years	4

Direct call average duration of participants

The following table is shown the average duration of direct call of participants.

Average duration of direct call	Denote by	Percentage
Less than 10 minutes	1	42.45%
Between 15 to 30 minutes	2	20.75%
Between 30 to 1 hour	3	19.81%
More than 1 hour	4	16.98%

The following Silhouette plot is shown direct call average duration of participant.

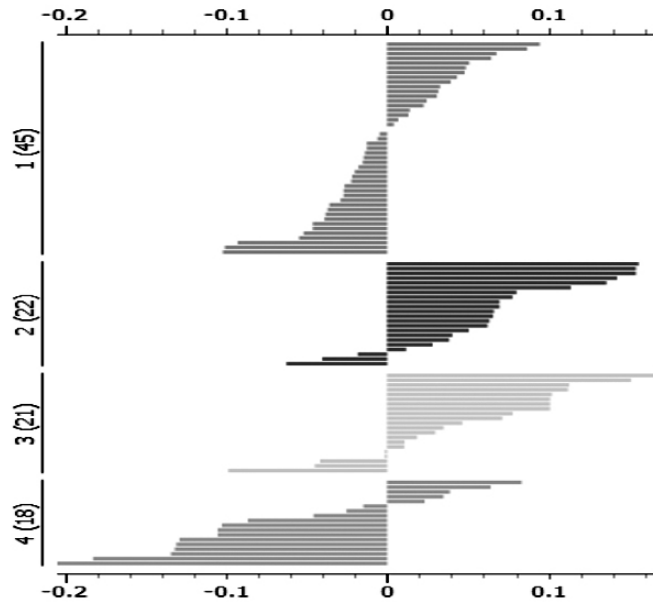


Figure 2. Direct call average duration

According to the data most people are made direct calls less than 10 minutes. According to the secondary data it has been found that exceeding 10 minutes continuously is not good to the user. But the collected data indicates that 57.55% of participant are making direct call over 10 minutes. Hence it is not a good sign.

Side of the ear

According to the collected data most participant are using right side of the ear to contact another person than left side of the ear.

Side of the ear	Denoted by	Percentage
Left of side	1	27.36%
Right side	2	72.64%

The following Silhouette plot is shown ear side of participant when they are in direct calls.

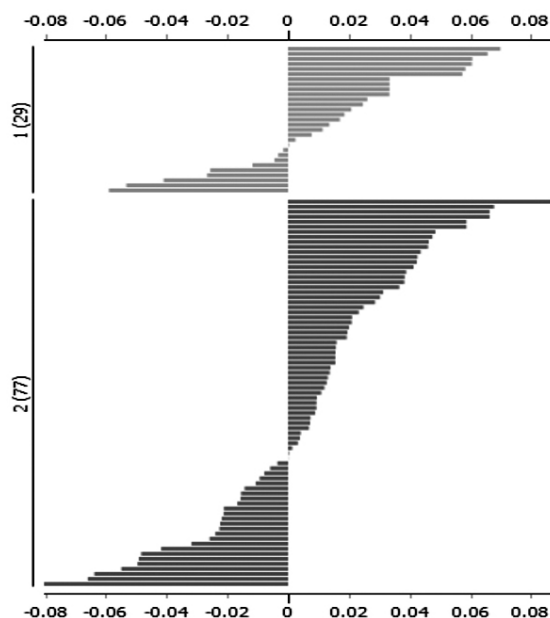


Figure 3. most use ear side of participant

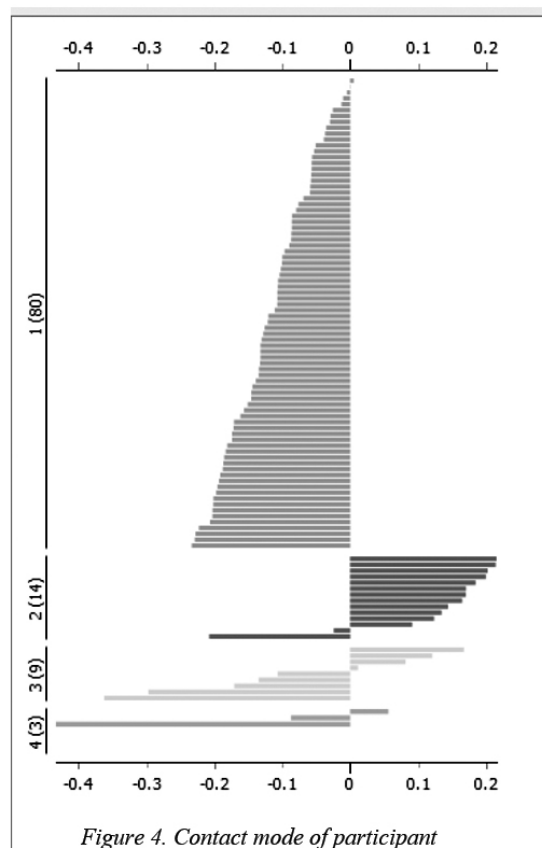
According to the secondary data making direct call in the right side of ear can causes memory loss and many other bad effects as well. But majority is using right side of ear. It's again not a good sign.

Most use contact mode of participants

Most of the participants keeps their mobile near to ear when they are on direct call. Few participants chose other mode when they talk through mobile phones.

Contact mode	Denoted by	Frequency	Percentage
Keeping in the ears	1	80	75.47%
Via ear phone	2	14	13.20%
Via speaker	3	9	8.50%
Bluetooth	4	3	2.83%

The following Silhouette plot is shown participant contact mode of participants when they are in phone.



It has found that keep mobile phone next to ear directly when make calls is not good. But less than 25% of participants only follows the recommended method while 75% participants are making calls in the wrong way. This means over some period can causes health issues.

The comparison between Headache and mobile use duration per day of participant

Participants who do experience headache and their mobile use duration per day.

Average duration of direct call	Frequency	Percentage
Less than 10 minutes	5/19	26.31%
Between 15 to 30 minutes	4/19	21.05%
Between 30 to 1 hour	6/19	31.57%
More than 1 hour	4/19	21.05%

According to the secondary data gathered it has found that 9 minutes and 36 seconds is the perfect duration to talking over the cellphone on average a day. But according to the above table 26.31% of participants are experienced headache even they are talked less than 10 minutes on the mobile. Hence, some other criteria may cause for headache. The following table shows the participants who do not experience headache and their mobile use duration per day.

Average duration of direct call	Frequency	Percentage
Less than 10 minutes	40/87	45.97%
Between 15 to 30 minutes	18/87	20.68 %
Between 30 to 1 hour	15/87	17.24 %
More than 1 hour	14/87	16.09%

Since 54.03% of participants are talked more than 10 minutes to the direct calls, they do not experienced headache.

Percentage of people who make direct calls more than 10 minutes per day on average.

	Frequency	Percentage
Feel headache after direct calls	14/61	22.95%
Do not feel headache after direct calls	47/61	77.05 %

According to the secondary data gathered it has found that 9 minutes and 36 seconds is the perfect duration to talking over the cellphone on average a day. Out of 61 people 20.95% of people have experienced headache after direct calls whereas 77.05% of people have not experienced headache after the direct calls.

Even though people exceeding 10 minutes, 77% of participants are not getting headache. This shows call duration is not one and only reason for headache.

The comparison between Headache and Contact mode of participant

Participants who do experience headache and their contact mode over direct calls.

Contact mode	Frequency	Percentage
Keeping in the ears	13/19	68.42%
Via ear phone	3/19	15.79%
Via speaker	3/19	15.79%
Bluetooth	0/19	0.00%

According to the secondary data gathered it has identified 80 percent of the absorbed radiation comes from Keeping the phone in the ears. Since 31.58 % of participants have experienced headache even, they do not use keeping in the ear as a contact mode.

Participant who do not experience headache and their contact mode over direct calls.

Contact mode	Frequency	Percentage
Keeping in the ears	67/87	77.01%
Via ear phone	11/87	12.64%
Via speaker	6/87	6.89%
Bluetooth	3/87	3.44%

According to the secondary data gathered it has identified 80 percent of the absorbed radiation comes from Keeping the phone in the ears. Since 77.01 % of participants have not experienced headache even, they do use keeping in the ear as a contact mode

Percentage of people whose contact mode is keeping in the ear on direct calls.

	Frequency	Percentage
Feel headache when the mobile phone keeping in the ear	13/80	16.25%
Do not feel headache when the mobile phone keeping in the ear	67/80	83.75%

According to the secondary data gathered it has identified 80 percent of the absorbed radiation comes from Keeping the phone in the ears. This could affect the memory function of human brain. According to this survey out of 80 participants 16.25% of people have experienced headache after direct calls over keeping in the ear whereas 83.75% of people have not experienced headache after the direct calls.

The following table shows the relationship between feeling headache and contact mode of keeping in the ear of participants.

Average duration of direct call	Frequency	Direct phone call usage through ears
Less than 10 minutes	5/19	4
Between 15 to 30 minutes	4/19	2
Between 30 to 1 hour	6/19	5
More than 1 hour	4/19	2

The following table shows the relationship between do not feel headache and contact mode of keeping in the ear of participants.

Average duration of direct call	Frequency	Direct phone call usage through ears
Less than 10 minutes	40/87	32
Between 15 to 30 minutes	18/87	14
Between 30 to 1 hour	15/87	12
More than 1 hour	14/87	9

Out of 19 people 13 people have experienced headache when their contact mode is keeping in the ear whereas 67 people out of 87 do not experience headache even, they chose their contact mode keeping in the ear.

To be conclude most people who have experienced headache according to the secondary source data the value didn't match with the responses I have derived.

Conclusion

People get headache depend on individual to individual, it may depend on contact mode, time duration, number of years of phone usage and many other reasons. According to the collected data most of the people are not following the recommend methods when they make calls such as average call duration, recommended ear side, contact mode when they make direct calls. The analysis data says majority are not getting headache but it does not mean that our society are free from health effects of cellphone radiation. It can be the level of nutrition they are consuming. In this pool the majority participants are in 21 – 30 age and the maximum number of usage years are between 5 to 10 years. Thus, if they continue this same method for long period of time means definitely, they will face high risk in their late 40 years. To be conclude though the headache level is less to our participants, we cannot assure that we are in safe environment because our society has not followed the recommended but we can change this by changing the current method to proper method.

References

- Bethany. (2013, 11 25). New Country 107.7 GNA ALBANY. Retrieved from New Country 107.7 GNA ALBANY website: <https://wgna.com/how-long-should-the-perfect-phone-call-last/>
- CharliShield. (2018, 08 10). DW. Retrieved from dw.com: <https://www.dw.com/en/is-your-mobile-phone-damaging-your-brain/a-45020000>
- Desk, T. (2019, 02 12). Mobile & Tabs. Retrieved from The Indian of Express.com: <http://indianexpress.com/article/technology/mobile-tabs/xiaomi-mi-a1-and-oneplus-5t-top-phones-emitting-highest-radiation-report-5578207>

Elvira Bormusov, U. P. (2008). Non-Thermal Electromagnetic Radiation Damage to Lens Epithelium. *The Open Ophthalmol Journal*, 2, 102–106. doi:10.2174/1874364100802010102

Khatri, M. (2019, November 05). WebMD Medical Reference. Retrieved from WebMD: <https://www.webmd.com/sleep-disorders/sleep-requirements>

Macmillan, A. (2017, 12 18). Time.com. Retrieved from Cellphone Radiation May Be Dangerous, California Health Officials Warn.: <https://time.com/5069317/california-mobile-phone-radiation/>

Macrae, F. (2010, 05 18). THE DAILY MAIL. Retrieved from <https://www.dailymail.co.uk/>: <https://www.dailymail.co.uk/health/article-1279133/Talking-mobile-just-30mins-day-linked-higher-risk-brain-cancer.html>

MailOnline. (2002, june 20). MailOnline. Retrieved from www.dailymail.co.uk: <http://www.dailymail.co.uk/health/article-124179/Radiation-mobiles-lead-brain-damage.html>

Ministry of Health, State of Israel. (2020). Mobile Phone Radiation. Retrieved from State of Israel Ministry of Health: https://www.health.gov.il/English/Topics/radiation/cell_phone/Pages/default.aspx

Naeem, P. D. (2014, October 8). Health risks associated with mobile phones use. Retrieved from *IJHS International Journal of Health Science*: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4350886/>

NIH National Cancer Institute. (2019, January 9). NIH National Cancer Institute. Retrieved from www.cancer.gov: <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet>

P. Velayutham, G. K. (2014, January). High-Frequency Hearing Loss Among Mobile Phone Users. *Indian J Otolaryngol Head Neck Surg*, 66, 169–172. doi:10.1007/s12070-011-0406-4

S. Zarei, S. M.-f. (2015). A Challenging Issue in the Etiology of Speech Problems: The Effect of Maternal Exposure to Electromagnetic Fields on Speech Problems in the Offspring. *J Biomed Phys Eng*, 151–154. Retrieved from [ncbi.nlm.nih.gov/pmc/articles/PMC4576876/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4576876/)

Shubham, S. G. (2017, 06 31). Effect of Mobile Phone Radiation on Human Brain. *Short Communication*, 5(1). doi:10.19080/AIBM.2017.05.555655

soravjain.com. (2018, April 2). 40 Amazing Digital and Social Media Marketing Stats and Facts of Sri Lanka – 2018. Retrieved from *Social Media Marketing Tips*: <https://www.soravjain.com/digital-and-social-media-marketing-stats-and-facts-of-sri-lanka-2018>

University of Arkansas for Medical Sciences. (2019, March 8). Medical Myths. Retrieved from UAMS Health: <https://uamshealth.com/medical-myths/can-cell-phones-damage-your-hearing/#:~:text=Unlike%20many%20medical%20myths%2C%20the,as%20high%20frequency%20hearing%20loss.>

vesttech.com. (2019). vesttech.com. Retrieved from www.vesttech.com: <http://www.vesttech.com/how-cell-phone-radiation-affects-our-brain-activity>

Vladimir Šinik, Željko Despotović, Sonja Ketin, Una Marčeta. (3-4.October .2019). RADIATION OF HIGH FREQUENCY ELECTROMAGNETIC FIELDS. IX International Conference Industrial Engineering and Environmental Protection 2019, 403-410.

Yakymenko, I. (2011). Electromagnetic Radiation and Sex Differences. CarelessScience.com. doi:10.13140/RG2.2.28837.19684

Zarei, S. M.-F. (2015). A Challenging Issue in the Etiology of Speech Problems: The Effect of Maternal Exposure to Electromagnetic Fields on Speech Problems in the Offspring. Journal of biomedical physics & engineering, , 151–154. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4576876/>

Machine Learning Approach to Support Cinnamon and Lucky Bamboo Cultivation in Sri Lanka

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Abstract

Cinnamon and Lucky Bamboo plants are very important plants which are exported from Sri Lanka. They are very versatile and there is a high demand in the foreign market. Unfortunately there is no proper system to obtain information about the diseases of these plants and selling prices. This application is very useful to recognize the diseases of Cinnamon and Lucky Bamboo and they can also view price predictions based on past selling prices. Farmer can capture the image of plant leaf or trunk and system will identify the disease. Machine learning algorithms are used to identify two types of leaf diseases and trunk diseases of cinnamon and lucky bamboo. The mobile application predicts the selling prices for Cinnamon using data mining and machine learning algorithms. The mobile application and the desktop application is developed using Android studio, python and React Native and Jupiter Notebook.

Introduction

The main native export crop (one of the main crops in Sri Lanka) in Sri Lanka is Cinnamon. Cinnamon is an evergreen tree characterized by oval-shaped leaves, thick bark, and a berry fruit. When harvesting the spice, the bark and leaves are the primary parts of the plant used. Cinnamon is cultivated by growing the tree for two years, then coppicing it, cutting the stems at ground level. Serious diseases reported from cinnamon in SE Asia are comparatively less and also are less economic importance. There has been no significant work done on diseases of cinnamon in Sri Lanka although this crop has been under cultivation for centuries and also in other South East Asian countries. Cinnamon is considered as one of the hardy plant and therefore, chances are comparatively less for severe pathogenic infections. Some of the diseases which have taken considerable attention in south East Asian countries have been described.

And in Lucky Bamboo there are certain growing conditions your lucky bamboo needs to be healthy, such as proper light, water, potting media, fertilizer, and temperature. When it comes to light, lucky bamboo prefers bright, filtered sunlight, such as what is found under a rainforest canopy. Avoid direct sunlight as it will scorch the leaves. Commonly sold growing in water, the lucky bamboo is not a true bamboo. This vigorously growing evergreen is a *Dracaena Sanderiana*, often referred to as the ribbon plant. This tropical plant thrives in most light conditions but requires, at most, moderate temperatures that fall no lower than 60 degrees F. The plant grows indoors or out (in warm climates), but is susceptible to several diseases which can disfigure the lucky bamboo if left untreated. When it comes to diseases in this tree are leaf spot is a fungal disease that is caused by varying fungi. Like many fungal diseases, the fungal spores of this disease travel onto the foliage of the lucky bamboo after lying dormant on fallen debris. The foliage of the infected bamboo develops small, dark-colored spots with reddish-colored margins.

Global sales for cinnamon exports by country totaled US\$691.1 million in 2018. The overall value of cinnamon exports rose by an average 47.6% for all exporting countries since 2014 when worldwide cinnamon shipments were valued at 468.2 million. Year over year, exported cinnamon appreciated 4.9% from 2017 to 2018. From a continental perspective, 86.7% of total cinnamon exports were shipped from Asia. Smaller percentages came from exporters in Europe (9.6%), North America (2.2%), Africa (1.2%), Latin America (0.2%) excluding Mexico but including the Caribbean, and Oceania (0.1%) led by Australia. Sri Lanka boasts of the best quality of cinnamon in the world. The country accounted for 8% of the world's cinnamon production in 2014 or 16,677 tons, making it one of the top cinnamon producers in the world. Cinnamon cultivation is mainly concentrated along the coastal belt from Kaluthara to Mathara. Some of the plantations may be found in Ratnapura and Ambalangoda. About 25,000 hectare of land in Sri Lanka is a cinnamon plantation. However, the size of the plantation has been diminishing over the years.

Cinnamon bark is an important spice that is employed in cookery as a flavoring material. It is often used in savory dishes of chicken and in preparation of chocolates, especially in Mexico. In the US, a cinnamon and sugar mixture is used to flavor cereal and other bread-based dishes. The mixture is also sold separately for the same purpose. Turkish cuisine is never complete without cinnamon spices. The Persians have also used cinnamon powder to enhance the flavor of their cuisine. Cinnamon has also been used as a traditional medicine for conditions such as bronchitis and diabetes. However, there is no scientific evidence of its health benefits.

For all those reasons we create a mobile application as a solution. In those days' farmers cannot find those diseases and predict price. So that this mobile application helps to find the diseases and find the future selling price as soon as possible. The system will be used the Image Processing technology to compare and find the disease through the photos of cinnamon leaf and stem and Lucky Bamboo. The system will be used the Data Mining technology to compare and find future selling price of Cinnamon.

Nevertheless, it also focuses on the skills required by stakeholders and their needs while defining high-level product structures.

Related Work

Literature review was conducted in four areas such as prediction using machine learning and datamining, identifying diseases of a leaf using machine learning, plant cultivations researches that has being carried out using different types of Neural networks and different studies about cinnamon and Lucky bamboo (Sandriana) plants.

i. Datamining

Component 1 : Predict Price of Cinnamon

From this user can get the prediction of future price based on the historical data set. This is come up with a specific neural network which can be trained with past 8to 10 years of data. Then from that identify a pattern between the price variations throughout dates [8]. It is difficult task to do manually. Then someone could be able to give a prediction when

the accuracy level may be very low. This problem is highly depending on the past price variation because of that the best one is to find a pattern that can be fit to them[9]. The price at the global market there can get high or low day by day based on multiple factors such as current time period of the year, weather changes etc. Thus group members thought that it's best one to use a data mining approach to give future selling predicted price with high accuracy level.

A group member got all the data from one of top seller in Sri Lanka. That group member got past data since 2005 to 2019 all are in one document then also calculate them and add to excel sheet then after that she get it to Microsoft SQL Server and generate a database from it. Then she gets it in to Visual Studio 2019 with Business Intelligence tool to get mining stricter and use time series Algorithm

II. Image Processing

Next three components of this mobile and desktop applications are run by using with Image Processing. First is taking photos of cinnamon leaf, trunk or Lucky Bamboo leaf and then training them [1]. The trained photo is compared to the photo of the cinnamon leaf, stem and Lucky Bamboo leaf by comparing this and diagnose cinnamon diseases and Lucky Bamboo diseases. They also compare Cinnamon trunk, leaf and Lucky Bamboo leaf photos with training photos and find which cinnamon bundle they belong to [2]. This will capture the image of Cinnamon leaf and stem and Lucky Bamboo leaf of diseases by Android and python tools and it will be connected with firebase as a data base.

Component 2 : Find Cinnamon Leaf Diseases

This component is doing get the lots of diseases photos that have cinnamon leaves and scanning by the software and get the diseases through the android application and desktop application [3]. New trends of research in agriculture aim towards the development of the disease resistant variant of seed using gene technology, which increase productivity and food quality at reduced expenditure [4].

Component 3 : Find Cinnamon Stem Diseases

This component is doing get the lots of diseases of photos that have cinnamon Stem and scanning by the software and get the diseases through the android and desktop applications. This research should be useful for providing site-specific information to plantation managers to assess the damage caused by the basal stem rot, to develop a strategic plan for infection control over the whole plantation, to identify areas that need to be controlled by showing the precise locations and the treatment of individual palms [5].

Component 4 : Find Lucky Bamboo Leaf Diseases

This component is doing get the lots of diseases of photos that have Lucky bamboo leaf and scanning by the software and get the diseases through the android and desktop applications [6]. The accuracy of the proposed system is compared with the existing classifier, which shows comparable results. The paper, is organized in four Section II describes the process of image acquisition and feature extraction [7].

Design and Development

From this intent to start scan the cinnamon leaves as well as trunk and lucky bamboo leaves and find the all diseases and get the all solutions for it. There are many oils get from cinnamon leaves. The aroma and flavor of cinnamon derive from its essential oil and principal component, cinnamaldehyde, as well as numerous other constituents, including eugenol. And also, see the width, color and design of trunk and get how many bundles can produce and get to know the prices. For some time, the price of cinnamon is predicted in this application. As a solution to the above mentioned reasons designing and implementing an android application will help to find these diseases.

Gathering of all data and information carried out according to the identified requirements. Data sources that gathered are divided into two categories they are primary and secondary. Primary data sources are obtained through interviews, surveys. Whereas secondary data are gathered from research journals, articles, books etc. Algorithm details were collected from related research papers and related processing algorithms

From this system can find the diseases of Lucky bamboo leaf and cinnamon leaf and trunk and find the solutions for it and also, we have focused on areas like image processing, data mining, among these things can understand the project.

Implementation

This application used the prototype methodology to make the application a success. In here the system used the system development life cycle. The System development life cycle consists of planning, analyzing, designing, and testing.

Data gathering was the initial stage and with the help of local farmers and state owners diseased plants were identified and gathered all the necessary information and images that the system will needed to finish the application successfully.

After gathering all the necessary information and images, Android studio and python Tkinter was used to design all the interfaces. To train the images and to predict the diseases, system uses InceptionV3 as the Neural Network.

The system is built and coded in this phase. Firstly, the application will be built and tested. Then the application is given to the users. The proposed system modules are assigned among group members who should be carried out in a proper organized and well-coordinated way. Meeting will be carried out more often to better coordination.

For this research, InceptionV3 is used as the Neural network to do Image Processing and need Fire base for data base engine. And also need Microsoft SQL Server to make database in data mining part and also this system need Visual Studio 2019 for get mining. When the designing user interface basic principles are to be followed such as the layout, content awareness, user experience, reduces the manpower. Then it is required to develop an interface design and evaluate it in order to understand the improvements to be made.

Results and Discussion

There are so many diseases that can be found in cinnamon leaves and the cinnamon trunk. And also there are so many diseases that can be found in Lucky Bamboo leaves. Nowadays, farmers have difficulties to find out what is the disease made up. So that, this application helps to identify that diseases as soon as possible using a user friendly mobile and a desktop application which has 3 main interfaces for capturing the images, displaying the predicted disease of the captured image of the leaf or trunk and displaying the price prediction once the user enters the year. Main objectives of our research was to find out whether the cinnamon leaf, trunk and Lucky bamboo plants are diseased by simply taking a picture of the related leaf or stem and identify the diseases from this application and to get a prediction about the market price of cinnamon and also to know the selling price and exporting price of any kind of cinnamon in global area in Sri Lanka. As the result, this application has achieved all the above and the accuracy is more than 80% for each and every prediction.

Conclusion

Agriculture is one of the main factors in each and every country. But due to lack of knowledge of the farmers, most of the yield crop is wasted due to disease infections and also the crops are treated with illegal substances to treat the diseases. Cinnamon is one of the main export crop in Sri Lanka, but a huge amount of yield is wasted due to delay of identifying of the diseases caused to the cinnamon leaf and stem. And farmers don't have a good idea about the export prices of the cinnamon.

Lucky bamboo plant is rising rapidly in the Asian market due to its unique beauty. And Sri Lankan weather is perfect for the cultivation of Lucky bamboo plants. But again due to the lack of knowledge in the specific field, farmers tend to treat the disease plants with harmful substances.

From this mobile and desktop applications, we were able to achieve our main goals. From our mobile application, anyone can simply get a picture of the cinnamon leaf and can identify whether it is diseased or not. If the plant is diseased, the application will provide useful and agricultural department approved remedies to take to overcome that diseases.

Anyone can simply get a picture of the cinnamon stem and can identify whether it is diseased or not. If the plant is diseased, the application will provide useful and agricultural department approved remedies to take to overcome that diseases.

Anyone can simply get a picture of the Lucky bamboo leaf and can identify whether it is diseased or not. If the plant is diseased, the application will provide useful and agricultural department approved remedies to take to overcome that diseases. Anyone can get a price prediction of how the export market of cinnamon changes in the future based on past export prices.

And also there are some limitations for our system such as,

- Only support for Android
- Mobile application should be connected to the internet in order to run the application.
- When capturing the images, should have proper lighting.

- Captured images should not be blurred.
- Users should have a simple knowledge about smart devices.
- Accuracy of the mobile application will not carry 100% (But more than 80%).

This application is mainly focused on Cultivation crops (identifying and giving remedies for diseases) and also predicting the export prices of the relevant crops. As future work,

- Developing the application to identify more diseases in Cinnamon and lucky bamboo (System can only identify the main diseases)
- Developing the application for more crops (Other than Cinnamon and Lucky bamboo)
- Develop the application to predict export price of other crops as well.

References

- [1] M. A. A. Kahar, S. Mutalib, and S. Abdul-Rahman, "Early Detection and Classification of Paddy Diseases with Neural Networks and Fuzzy Logic," *Sci. Ser. J.*, vol. 2, no. 1, pp. 248–257, 2010.
- [2] S. B. Kutty et al., "Classification of watermelon leaf diseases using neural network analysis," *BEIAC 2013 - 2013 IEEE Bus. Eng. Ind. Appl. Colloq.*, no. January, pp. 459–464, 2013.
- [3] V. Ramya and M. A. Lydia, "Leaf Disease Detection and Classification using Neural Networks," *Int. J. Adv. Res. Comput. Commun. Eng.*, vol. 5, no. 11, pp. 207–210, 2016.
- [4] J. Gocławski and J. Sekulska-Nalewajko, "An image segmentation method to reveal regions of stress manifestation in stained cucurbits' leaves using LVQ neural network," *Autom. / Akad. Górniczo-Hutnicza im. Stanisława Staszica w Krakowie*, vol. T. 15, z. 3, no. January, pp. 105–118, 2011.
- [5] X. Yang and T. Guo, "Machine learning in plant disease research," *Eur. J. Biomed. Res.*, vol. 3, no. 1, p. 6, 2017.
- [6] S. R. Maniyath et al., "Plant disease detection using machine learning," *Proc. - 2018 Int. Conf. Des. Innov. 3Cs Comput. Commun. Control. ICDI3C 2018*, no. July 2019, pp. 41–45, 2018.
- [7] S. S. Sannakki and V. S. Rajpurohit, "Classification of Pomegranate Diseases Based on Back Propagation Neural Network," *Int. Res. J. Eng. Technol.*, vol. 2, no. 2, 2015.
- [8] P. Yu and X. Yan, "Stock price prediction based on deep neural networks," *Neural Comput. Appl.*, vol. 32, no. 6, pp. 1609–1628, 2020.
- [9] H. Ebrahimian, S. Barmayoon, M. Mohammadi, and N. Ghadimi, "The price prediction for the energy market based on a new method," *Econ. Res. Istraz.*, vol. 31, no. 1, pp. 313–337, 2018.

“SMART FARMER”

Mobile application for agricultural based logistic management and consultant service

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Abstract

Mobile applications and services make things easier and simpler for the daily needs of the people. Although Sri Lanka is an agricultural country, there is a lack of applications, which can be really useful for the farmers as well as customers. In this paper research team proposed one such mobile application “SMART FARMER” for agricultural based logistic management and consultant service. In Sri Lanka farmers faced many problems because they do not have a suitable market for sell their products, they cannot find the actual reasons for some crop diseases and they faced problems in waste management processes. This application will help to the farmers working with the motive of high profitability by direct communication between farmers-to customer, farmer-to-consumer, farmer-to –farmer and also farmer-to-agricultural consultants. Therefor this system is an effort to fill the gap between farmers and merchants. The system use the Global Positioning System (GPS) and a system bidding.

Keywords

Mobile Application, agricultural, logistic management, consultant service, system bidding, GPS.

Introduction

Farming is important to everyone because it forms the basis needs food security and also it has been an important part of the economy for thousands of years. In Sri Lanka farmers faced many problems because they do not know such technology skills. Today, mobile phones have become more familiar with the people and therefor a lot of research is happening on the use of mobiles. So the research team decided to introduce a mobile application to the farmers. There are no such a mobile application is Sri Lanka to help farmers for their sales and other agricultural problems they faced.

“SMART FARMER” for agricultural based logistic management and consultant service mobile application help the farmers to direct communication with consumers, customers and consultants. This service is also provide new technology features to increase the productivity. It provides an option of login to farmers and do their sales. Using this system, farmers can provide inputs related to products being cultivated or manufactured and customers can bid for the products and buy. The developed system use the Global Positioning System (GPS) for location tracking. It provides detailed information about the waste removed from the farms and notify it to the nearest registered consumers. This system has a direct chat box with agricultural consultants and farmers able to discuss

the problems they faced with crop diseases or farming related problems.

The system has lot of benefits to the user. That are separate login areas with appropriated functionality for farmers, customers and consultants and there are effective graphical user interfaces (GUI) to understand easily how the system working. As a result the system is to be developed mainly for the medium scale farmers. However the main reason for developed such as application is to make the farming environment more efficient and productivity.

Related Works

A. Bidding system for dairy products selling.

According to Popa Cosmin and Chiran Aurel research of identify the logical structure of data and particularities of developing and testing a website designed for selling farm products through online auctions. The technology that researches used for developed the project was PHP, Java and SQL database. In that online environment usually the seller establishes a fixed date as time for every auction and the software automatically decide the winner at the finish date, based on the highest bid. A valid bid must fulfill the following requirements in order to be accepted by the system [1].

- The user placing the bid is not the same user who started the auction.
- The first bid must be at least as high as the starting price and the next bid must be at least 1% higher than the previous one.

Another research was an android application for online agri-auction. Authors of this research paper was Nirali A. Kannasagara, Trupti M. Khurape, Jyoti S. Kamble and Manasi M. Kulkarni. In methodology, the aim was developed an android application to provide a user-friendly application for the buyers and sellers / farmers to auction their products easily. For online users there is a secure registration of all users including a personal profile administrators would authorize the product to auction, set auction dates and minimum auction amount for that product. Administrator can take a backup of the database for every auction that is happening periodically. The technologies used ware Android studio and (OLTP) database model [2].

Online bidding application for farmers to increase the agricultural productivity is one of the onother research done by Shreekara S.S, Kumar Ayush, Vishalayya S and Sharath A.U. Cloud platform and the model View Controller (MVC) design pattern was the technologies that they were used for develop the research. This auction model website is hosted in the amazon elastic cloud compute server which could be a reliable but also provide so many advantages such as scalability and cost effectiveness. Bidding moves from low price to progressively high price and auction is closed when higher bid for the item is made. Seller sets a margin price [3].

Above mention researches used bidding systems for transaction. In developed system, there is a system bidding function and customers able to get the products easily.

B. Harvested crops selling and payment method.

According to Shrikant Waghulkar, Kumardtt Ganjre, Nitesh Behare and Niranjana Diwan

research of a feasibility study for online marketing of agriculture greenhouse products, the system design for the only sale the greenhouse products through the online platform. In this platform implements the wholesale markets for the farmers [4].

Online agriculture products sales in Taiwan is another research done by the Seiichi Fujita, Hideo Hohgi and Shigeru Nishiyama. The main objective of the research is create the online business model for online vegetable sales. The online system introduces several benefits:

- Provide the complete certification and verification report.
- Provide the purchase history record.
- Save the shopping time.

The users can read thousands of agricultural products descriptions and can compare the different products at the same time. It helps customers to trace the purchases easily [5]. E-commerce site for agriculture products is a research done by the Megha Nayak, Pinky Wankhede, Neha Khapekar and Komal Dhote. The website is built the online platform for the farmers, admin as well as the customers for buying and selling the agricultural products.

Farmers get a unique interface where they can sell the products, get the rates of the market, get in touch with SMS and E-mail and gather the knowledge about different schemes. Farmers get the benefits of selling the products at the best price online. It supports the different business models such as multi-suppliers, e-sales and several types of auctions [6].

C. Disease recognition and consultant service.

Diseases in plants cause major production and economic losses as well as reduction in both quality and quantity of agricultural product. According to K.S. Usharani, B. Surendranath and S.M. Paul Khurana, a several leaf curl diseases has been observed since 1999 in potato crops. The affected plants were severely stunted by apical leaf dizziness and crushed leaves and prominent mosaics. This is the first case of a begomo virus causing potato disease in India. According to nucleotide sequencing data, the cause is a virus closely related to ToLCNDV [7].

Another research was Effector Genomics Accelerates Discovery and Functional Profiling of Potato Disease by Hendrik Rietman et.al. According to research the world's fourth largest food crop yet it continues to endure a devastating disease causes by the Irish famine pathogen *phytophthora infestans*. According to their findings, efficient genetics allows for the detection and functionalization of late-onset R&D genes at an unprecedented rate [8].

Adoption of computers and consultant services by New York dairy farmers is another research done by W.F. Lazarus and T.R. Smith. According to the research it shows the rate of adoption of computers and consultant service by New York dairy farmers and data were from form business summery program. [9].

D. Waste disposal management and delivery system

According to Agriculture waste management case study of a waste treatment plant for animal manure. The problem of agricultural waste management is studied in the Northern agricultural region of the Galilee. The aim of this article is to present a method for evaluating comprehensive solution for agricultural waste treatment, including choosing the suitable technology relating to economic aspects, to agricultural needs, and complying with environmental regulations and acts of the region. The following methods and tools were implemented: data questionnaire was conducted by surveying the region [10].

Another research was Agriculture waste concept, generation, utilization and management is a system for utilization and management waste. Agricultural wastes are non-product outputs of production and processing of agricultural products that may contain material that can benefit man but whose economic values are less than the cost of collection, transportation, and processing for beneficial use. [11].

Implementation of GPS Based Object Location and Route Tracking on Android Device. Location based services has enable people to locate and track the location of other people, objects, machine, vehicles and resources, from the comfort of their home as long as they have the required gadget such as smart phone, PDA's, and others (Adusei, et al, 2004). [12].

	Portal to connect farmers & customers	Consultant service	Bidding system
Agri app	X	√	√
Seed co:	X	√	√
Market yard	X	X	X
SMART FARMER	√	√	√
	Waste management	Fully automated payment method	Delivery system
Agri app	X	X	X
Seed co:	X	X	X
Market yard	X	X	√
SMART FARMER	√	√	√

Table 1: Research gap

Methodology

To implement the Smart Farmer mobile application the research team is selected prototype methodology. When executing the methodology there is a process to follow. Identify the basic requirements, develop the initial prototype, review, revise and enhance the prototype. This process repeatedly happens until the product is achieved their final goals. First, the initial prototype is developed with minimum functionalities.

During the second prototype implemented all the essential functionalities. At the final prototype included all the other functionalities to view the final version of the final working application.

In the requirements gathering and analysis stage, research team gather requirements used in two techniques.

To gather the primary data the research team, create a questionnaire. The research team planned to do interviews with the users. But, the research team unable to do the interviews because of the pandemic issue.

Therefore, the research team prepared a questionnaire using the google form and distributed among the users. This questionnaire was distributed to get ideas about the developing application.

To gather the secondary data the research team studied the literature reviews of the similar applications. Studying similar applications through literature reviews the research team identify what has already been done, the scope of the particular component and identify the research gap.

In the designing stage research team divided the application into several parts according to the prototype methodology and implemented the main components according to the methodology.

• Bidding system for dairy products selling

The online auctions consist of an auctioneer providing an internet-based platform to match the seller with buyers. In this, the seller will post the product and bid accordingly, and the bidding will have a specific time limit which will be set by a seller of the product. The buyer with the highest bid, the product will be sold to the bidder.

• Harvested crops selling and payment method

This part implemented the online platform to the farmers and customers. Farmers can be posted their products to the application. And customers can compare the different products at the same time and purchase. The customers can add their purchased products into the virtual cart and if the does not want to buy it they can remove the products from the cart. Customers can pay the bills using the online payment gateway via credit cards.

• Disease recognition and consultant service

The system already added some common crop diseases to the application. Referring to those diseases farmers can get basic knowledge about the diseases. To get more

information about the issues farmers can use the consultant service. This part includes the chat box to chat with consultants.

• **Waste disposal management and delivery system**

Farmers can advertise their waste, and the notification is sent to the nearest consumers via GPS technology through an application. Customers can be brought their purchased items right at the door.

The following figure illustrate the software architecture diagram of the Smart Farmer application. The application is built on the react-native framework and the application communicates with the firebase server. Application is also able to connect to the Google Maps API using the API key in the google cloud platform.

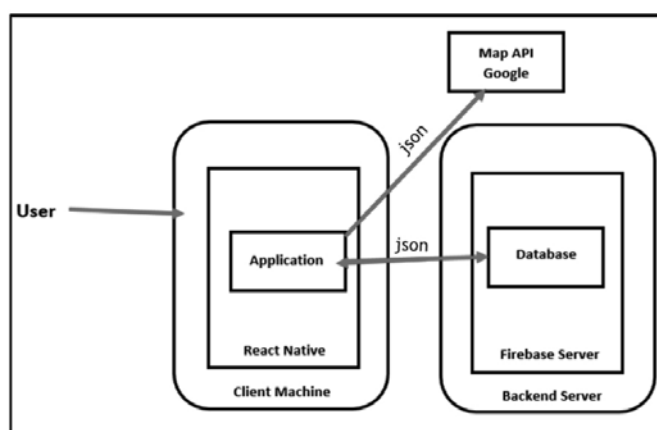


Figure 1: Architecture diagram

Results And Findings

• **Chat with consultant Interface.**

This interface allows farmers to directly chat with the consultant and get the information about cultivation and diseases issues.



Figure 1: Sell Dairy Products interface

- **Harvest Interface.**

This interface allows farmers to add their harvest into the application. All the included products can purchase on the customer lateral.

A screenshot of a mobile application interface titled "Harvest". At the top, there is a back arrow and the title "Harvest". Below the title is a circular logo with the text "Smart Farmer". The form contains several input fields: "Select Category" with a dropdown arrow, "Quantity (Kg / Pieces)", "Price (1 Kg / 1 Pieces)", "Harvested Date", "Phone Number", and "Description". The "Description" field is a larger text area. At the bottom, there is a mobile navigation bar with three icons: a hamburger menu, a home icon, and a back arrow.

Figure 2: Harvest Interface

- **Sell Dairy Products interface.**

This interface allows farmers to add the dairy products onto the application. And farmer can also set the bid price.

A screenshot of a mobile application interface titled "Sell Dairy Products". At the top, there is a back arrow and the title "Sell Dairy Products". Below the title is a circular logo with the text "Smart Farmer". The form contains several input fields: "Topic of the Product", "Contact Number", "Bid Starting Price (Rs.)", and "Due Date". Below these fields is a large text area for additional information. At the bottom, there is a mobile navigation bar with three icons: a hamburger menu, a home icon, and a back arrow.

Figure 3: Sell Dairy Products interface

• **Sell Your Waste Food Interface.**

This interface publishes an advertisement about the fertilizer. The advertisement appears on the nearest consumers through GPS technology. The map is shown in the application.



Figure 4: Sell Your Waste Food Interface.

Discussion

“SMART FARMER: Mobile application for agricultural based logistic management and consultant service” This application will provide a useful help for farmers as well as customers. The research has been accomplished by developing an android application. System is implemented by using prototype methodology.

Above mentioned statements are aspiration of our research. The project team faced few problems while implementing the SMART FARMER mobile application system.

Conclusion

“SMART FARMER” agricultural based logistic management and consultant service mobile application, help the farmers working with the more profitability by direct communication between farmer-to-customer, farmer-to-farmer, and farmer-to-consumers. In addition to that farmers can chat their problems related to crop diseases, agricultural consultants. The developed system is tracking the GPS of the current location of the farmer and it connects to the most suitable customers or consumers.

The “SMART FARMER” application will improve the cultivation and agricultural products in Sri Lanka.

Future Works

As the research team selected a research topic with a broad area, the team hopes to improve the system by adding more features. Such as, rated the service of consultants, developing the image processing segment for disease recognition fields and In addition to potato and tomato leaf diseases, our system hopes to include details on the symptoms and treatment of other crop diseases.

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References

- [1] "Designing a Multilingual Auction Website for Selling Agricultural Products" [Online] Available:<https://publications.waset.org/14662/designing-a-multilingual-auction-website-for-selling-agricultural-products> [Accessed: January 2007].
- [2] "Mobile Application for the Agricultural Mandi using E-Auction" [Online] Available:https://www.academia.edu/36975584/Mobile_Application_for_the_Agricultural_Mandi_using_E_Auction [Accessed: May 2018].
- [3] "ONLINE BIDDING APPLICATION FOR FARMERS TO INCREASE THE AGRICULTURAL PRODUCTIVITY" [Online] Available:http://www.kscst.iisc.ernet.in/spp/40_series/SPP40S/01_Seminar%20Projects/083_40S_BE_0607.pdf [Accessed: January 2015].
- [4] "A FEASIBILITY STUDY FOR ONLINE MARKETING OF AGRICULTURAL GREENHOUSE PRODUCTS W.R.T. PUNE DISTRICT" [Online] Available:http://www.iaeme.com/MasterAdmin/Journal_uploads/IJM/VOLUME_8_ISSUE_1/IJM_08_01_011.pdf [Accessed: February 2017].
- [5] "ONLINE AGRICULTURE PRODUCT SALES IN TAIWAN-A NEW VENTURE BUSINESS PLAN" [Online] Available:<https://core.ac.uk/download/pdf/144443914.pdf> [Accessed: 2012].
- [6] "E-COMMERCE SITE FOR AGRICULTURE PRODUCTS" [Online] Available:<https://www.irjet.net/archives/V6/i4/IRJET-V6I476.pdf> [Accessed: Apr 2019].
- [7] "Potato leaf curl – a new disease of potato in northern India caused by a strain of Tomato leaf curl New Delhi virus" [Online] Available:<https://bsppjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.0032-0862.2004.00959.x> [Accessed: April 2004].

[8] "Effector Genomics Accelerates Discovery and Functional Profiling of Potato Disease Resistance and Phytophthora Infestans Avirulence Genes" [Online]
Available:<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0002875>
[Accessed: August 6, 2008].

[9] "Adoption of Computers and Consultant Services by New York Dairy Farmers" [Online]
Available:<https://www.sciencedirect.com/science/article/pii/S0022030288797313>
[Accessed: June 1988].

[10] "Agricultural Waste Management: Case Study of a Waste Treatment Plant for Animal Manure" [online]
Available:https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1599603[Accessed:May 3, 2010].

[11] "AGRICULTURAL WASTE CONCEPT, GENERATION, and UTILIZATION AND MANAGEMENT" [online] Available: https://www.researchgate.net/publication/308880744_AGRICULTURAL_WASTE_CONCEPT_GENERATION_UTILIZATION_AND_MANAGEMENT [Accessed: October 2016]

[12] "Implementation of GPS Based Object Location and Route Tracking on Android Device" [online]
Available:<https://www.ftms.edu.my/journals/pdf/IJISE/Nov2015/61-72.pdf> [Accessed: November, 2015]

“RIYA PASALA”: Driving license voice based examination application for illiterate people

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Abstract

This paper discusses “Riya Pasala”, a voice-based driving license examination system specially targeting the illiterate people. This system also includes an android application that help any candidate to learn and prepare for the theory exam. With the existing system, examiner has to read out the questions to illiterate person and mark the answers stated by candidate. This has several issues due to human errors. ‘Riya Pasala’ is designed to overcome the issues of the current system by eliminating the need of an individual examiner per candidate. This system provides a web portal, where the examination can be conducted via oral commands given in ‘Sinhala’ language. The questions will be vocally presented to candidate where the candidate can state the answer and it will be recorded. Soon after the exam the results will be generated. The android application provide sample exam papers, and user can practice them and view correct answer. The “Riya Pasala” android application provides voice descriptions of live road signals by capturing road signs. This system would be very useful for illiterate people as well as normal people to learn and practice driving theory. Both web portal and the application are implemented using the Sinhala language.

Keywords

Illiterate people; android application; voice recognition; web portal; voice-based questions; live road signals

Introduction

In today's world learning capability is judged by mode of examinations so the same procedure is applied when people have an intention in order to take driving license. These examinations should be very easily available and accessible for all the candidates. But this procedure becomes really embarrassing for illiterate candidates. There are some problems in the already existing projects or the products. The existing process can be frauds of both the examiner and candidate and it is time wasting. Motor traffic department in Sri Lanka have not used any computer-based system for driving license examination. Some android applications for sample questions, but illiterate people cannot understand and use that applications. Illegal, immoral behaviors and dates postponing activities are the disadvantages that are embedded in this assessment that load up to illiterate people. Most of the current applications and the research projects did not focused on this area. Their main focus is to publish the driving license exam past papers, but illiterate people cannot get use of it.

This paper covers the “Riya Pasala” web portal for the illiterate people to be tested in

driving license oral examination and “Riya Pasala” android mobile application, which encourages possibility to get some help in breezing through driving license examination. The mobile application provides voice descriptions of live road signals after capturing the image. This is the uniqueness of this system. In the present context there are no apps developed to capture the image and gives out the output from voice description. Not only that illiterate people and normal people can get previous sample voice-based question and check user accuracy by their own. This portal will be a more interactive and helpful to attend the examination as we base it on voice recognition and speech interface for the illiterate candidates to attend their examination will be added. This system includes both a web portal and a mobile application using the Sinhala language.

Related works, methodology, materials and methods, development, results and discussion, and conclusion are discussed in the following pages.

Related works

This section explains previous works based on the area. Most of the research can be broadly classified into three approaches. Voice transaction interface, live image processing and the Unicode.

Ramiah et al. [1] present a way of detecting text-based image with optical character recognition for English translation and speech using android. In this study, an Android application is developed by integrating tesseract OCR engine, Bing translator and phones’ built-in speech out technology. Final deliverable is tested by various type of target end user from a different language background and concluded that the application benefits many users. By using this app, travelers who visit a foreign country able to understand messages portrayed in different language. Visually impaired users are also able to access important message from a printed text through speech out feature. [2,3,4,5,6] These referenced papers also discusses about image processing.

Khan et al. [7] invent project proposes a system that will create a revolution in a world of education by providing an easier way for visually impaired people to take tests just as normal students do. Major disadvantage is that they have to give a voice input in a clear manner, there should be some mismatch, while giving a long word as input, there may be noise suppression and also for different language other than English they are not feeling comfortable. The project is a window application in .NET that can be used to conduct examination for physically challenged. The project has mainly used following techniques: • Speech synthesis • Speech recognition • CBIR (technique use to match images). Kannan [8] invent a voice interface to a social networking service. It is relating to machines that are configured process data. The present disclosure addresses system, methods and computer program products that facilitate generation of provision of a voice interface to a social networking service. [9,10,11,12] These referenced papers also discusses about voice transaction interfaces.

Punchimudiyanse and Meegama [13] developed a new Sinhala encoder algorithm. It includes Special Features Associated with Phonology of Sinhala, Improved Phonetic Tag Set, Sinhala Unicode to Phonetic English Decoder Algorithm, Phonetic English to Sinhala Unicode Encoder Algorithm Unicode Sinhala and Phonetic English for Sinhala Speech Recognizer. [14,15,16] These referenced papers also discusses about unicode.

Methodology

This project developed under the scrum method, which is to help the system test in the field. This method ensures that the user can work together with the system and gather the feedbacks from the results of the system. This method will help to understand the software requirements. By using this scrum method not only understanding the software requirements but also it helps to understand the system by finding errors and mistakes also it helps to improve the system. Scrum method is better for a complex system.

A: System framework

Web Portal

“Riya Pasala” web portal is a voice-based examination system where, illiterate candidates can participate the vocal driving license examination as shown in the following,

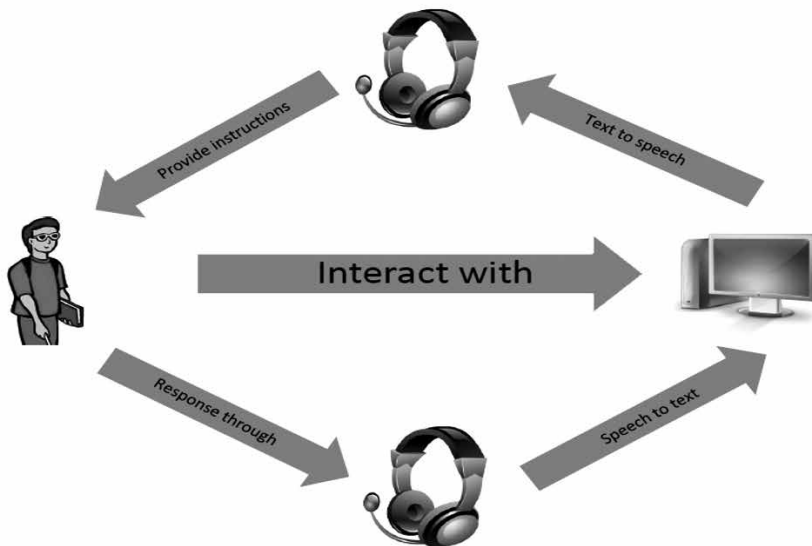


Figure 1: Web Portal

This portal will be a more interactive and it will be helpful to attend the examination as we base it on voice recognition, and it increases the interaction between the system and user. Speech interface for the illiterate candidates to attend their examination will be added and also will be added features for evaluating the candidates MCQ answers automatically. End of the web portal candidate's answers will be automatically stored to the database.

Android Application

“Riya Pasala” mobile application is a tool which supports candidates to learn about road signs and can practice for the examination as shown in the following,

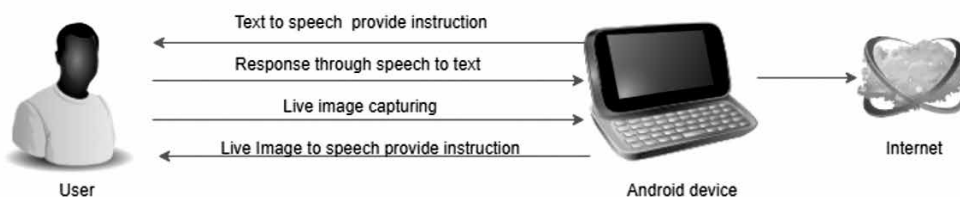


Figure 2: Android Application

The application provides voice descriptions of live road signals by capturing image. Not only that illiterate people or normal people can get previous sample voice-based questions by own. It will be more helpful for illiterate people; they can practice these sample questions before the examination date.

Road Sign Game Application

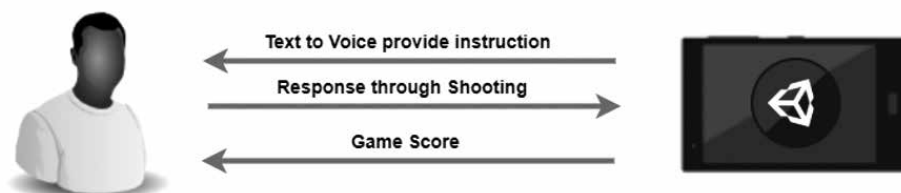
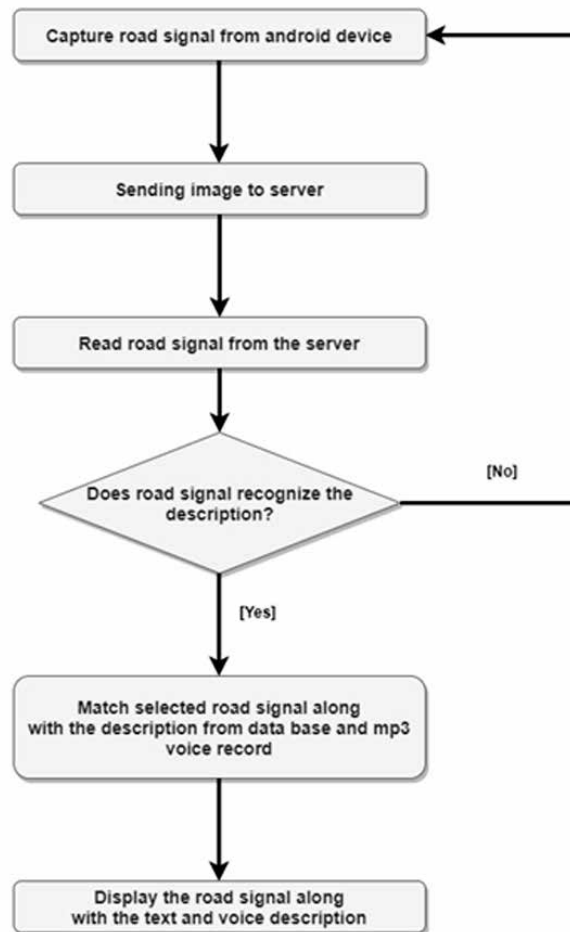


Figure 3: Road Sign Game

This application provides the user to improve the road sign identification capability while providing an enjoyment.

Live road sign processing along with the voice outputs

Live image processing along with the voice outputs is the major feature of this system. In this android application it is done by using phone camera. The application uses the camera present in the phone for road signals capturing and description display on the screen.

**Materials and Methods**

We have implemented the train data for process the road sign using the tensorflow software (<https://www.tensorflow.org/>). We have implemented the algorithms for detecting road signs and gives an output in both Sinhala voice and text for android application using android studio software. Android is the most widespread operation system for mobile devices and permits open code to be used and programed, using a free license (<https://developer.android.com/>). The programming environment java script (<https://www.w3schools.com/js/>) for the web portal and android studio for the mobile application using java language. The algorithms to get the correct answer and calculate

the total in paper have been implemented for mobile application using the android studio and for the web portal using java scripting. We have implemented the road sign game for android mobile devices using unity (<https://unity.com/>). We have created databases for the mobile application using sqlite (<https://www.sqlite.org/index.html>) and for the web portal using mySql (<https://www.mysql.com/>). And implemented the algorithms for voice recognition using Google API technology (<https://cloud.google.com/speech-to-text>).

Development

“Riya Pasala” android application focus of four major components. There are live road sign detection, model paper questions, road sign categorizing and road sign game. “Riya Pasala” web portal focus of exam paper.

100 images of different road signs at different places used for the data training. We photographed all road signs using a digital single lens reflex (DSLR) camera (Eos 550D, Canon Inc, Japan) used to acquire high quality images with a size of 3450 × 2304 pixels and a resolution of 0.03mm pixel-1. We took theses reference images in different angles. Data training and conversion trained data to the tensorflowLite file using tensorflow software. We recorded all the road sign description, questions of the papers, answers and needed commands for both applications. We imported TensorflowLite file and needed MP3 voice recordings to the android studio before starting the coding.

Results and Discussion

The system is mainly based on voice capturing and live image processing. So, it is important to get the correct voice and image. So, the system must be reliable of capturing voice and processing live images. Figure 5 shows the successful operation of detecting live road signs. And it also provides Sinhala voice description of the road sign after capturing.

Voice transaction interface is used by the candidate to do android app practice papers and the web portal exam. All the instructions, questions and answers are described over a voice output. In every question there are 4 answers and these answers are numbered 1,2,3 and 4. When the candidate answers the question with the respective number of the answer the system will detect the correct answer and it will be highlighted on the interface. Above scenario is expressed in the figure 6.



Conclusion

The major aim of this research was to develop a voice-based web examination system and android application for illiterate people. Improve the interactivity of the system with illiterate people to increase the self-confident, Motive through reduce in the third person involvement, Provide the facility to the illiterate people as normal people receives during the examination environment, Improve the efficiency by decreasing time wasting and Eliminate the frauds of both the examiner candidate are the benefits of this research. The major advantage of this android application is to enable illiterate people to have a clear idea on road signals and signs where they cannot be able to learn from any other source.

There are some limitations in this system. The system should operate in a calm, low noisy environment. High noise levels will disturb voice capturing processing. We must do the live road sign capturing in average speed conditions. The speed of the mobile application and the web portal depend on the speed of the internet connection and the processing speed of the respective device. The mobile application does not support any platform other than Android.

Future Works

Research team has identified few areas which might attract potential researches in near future. Mobile application development with multi-platform support. Development of the web portal and android application to work offline. Development of the application and portal in any language other than Sinhala

References

- [1] Mitpublications.org, 2019. [Online]. Available: http://www.mitpublications.org/yellow_images/1441275739_logo_2.pdf. [Accessed: 01- Sep- 2019].
- [2] Anon, (2019). [online] Available at: <https://ieeexplore.ieee.org/document/7399027/metrics#metrics> [Accessed 1 Sep. 2019].
- [3] Ieeexplore.ieee.org. (2019). Detecting text based image with optical character recognition for English translation and speech using Android - IEEE Conference Publication. [Online] Available at: <https://ieeexplore.ieee.org/document/7449339> [Accessed 29 Aug. 2019].
- [4] Patentimages.storage.googleapis.com, 2019. [Online]. Available: <https://patentimages.storage.googleapis.com/66/fa/8e/4b7b131362b381/US7249123.pdf>. [Accessed: 03- Sep- 2019].
- [5]"Real-time implementation of voice activity detector on ARM embedded processor of smartphones - IEEE Conference Publication", Ieeexplore.ieee.org, 2019. [Online]. Available: <https://ieeexplore.ieee.org/document/8001430>. [Accessed: 01- Sep- 2019].
- [6]G. Dias, "Challenges of enabling IT in the Sinhala Language", DI.lib.mrt.ac.lk, 2019. [Online]. Available: <http://dl.lib.mrt.ac.lk/handle/123/12223>. [Accessed: 01- Sep- 2019].

- [7] Pdfs.semanticscholar.org, 2019. [Online]. Available: <https://pdfs.semanticscholar.org/5508/adfc59bdee1b55ca7884dc5274005a50f599.pdf>. [Accessed: 01- Sep- 2019]
- [8] Anon, (2019). [online] Available at: [https://scholars.cityu.edu.hk/en/publications/a-review-on-voice-userinterface-for-illiterate-people\(f48dec78-632d-4f90-942d-9d693614811c\).html](https://scholars.cityu.edu.hk/en/publications/a-review-on-voice-userinterface-for-illiterate-people(f48dec78-632d-4f90-942d-9d693614811c).html) [Accessed 1 Sep. 2019].
- [9] Anon, (2019). [online] Available at: <http://dl.lib.mrt.ac.lk/handle/123/12231> [Accessed 1 Sep. 2019].
- [10] Anon, (2019). [online] Available at: <https://arxiv.org/abs/1808.06465> [Accessed 1 Sep. 2019].
- [11] Program, c., methods, a., algorithm, c., methods, c., reaction, c., detection, e., processes, e., dirt, f., analysis, i., method, i., methods, q. and tapping, r. (2019). US9275281B2 - Mobile image capture, processing, and electronic form generation - Google Patents. [Online] Patents.google.com. Available at: <https://patents.google.com/patent/US9275281B2/en> [Accessed 29 Aug. 2019].
- [12] "Google Patents", Patents.google.com, 2019. [Online]. Available: <https://patents.google.com/patent/US9392237B2/en?q=US+9392237B2+>. [Accessed: 03- Sep- 2019].
- [13] Anon, (2019). [Online] Available at: https://www.researchgate.net/publication/273460756_Android_Based_Portable_Hand_Sign_Recognition_System [Accessed 29 Aug. 2019].
- [14] Patentimages.storage.googleapis.com, 2019. [Online]. Available: <https://patentimages.storage.googleapis.com/d0/73/6a/b34290f478545b/US20150149354A1.pdf>. [Accessed: 03- Sep- 2019].
- [14] Patentimages.storage.googleapis.com, 2019. [Online]. Available: <https://patentimages.storage.googleapis.com/56/ca/f4/52138db5079dd1/US9111407.pdf>. [Accessed: 03- Sep- 2019].
- [15] "ScienceDirect.com | Science, health and medical journals, full text articles and books.", Sciencedirect.com, 2019. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S1877042815028190/pdf?md5=01f0485b1ce4d0f9c947dcc2ef311abc&pid=1-s2.0-S1877042815028190-main.pdf>. [Accessed: 03- Sep- 2019].

Profile of Cyber Criminal

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Abstract

A close relationship between mankind and technology has arisen as a result of the technical changes that have taken place with the globalization. Now the internet is going parallel with human lives. Because of this close relationship, people have allured to do good things as well as bad things. Among the bad things which humans are involving, cyber-crimes take prominent place. The psychological and social states of a person is a main reason for the person to get engaged in an immense crime like cybercrime. This research paper aims to discuss, how they have used their psychological and social states to do these cybercrimes. For what they hack the computer systems of others. What kind of family background leads the people to become cyber criminals.

Keywords

Daniel of service, cybercrime, psychology, Hackers, Intrinsic and Extrinsic motivation, Aggressiveness, Hacking

Introduction

Cyber-crime is a computer based crime which affects to lose financial and personal information. Those who do that kind of crimes are often referred as hackers. There are various cyber-crimes in the society; email bombing, salami attacks, Dos attack, logic bombs, Trojan horse, internet time thefts, web jacking.

When comparing cyber-crimes with other crimes, cyber-crimes can't be classified easily because there are many different types of hackers and they have various motivations behind their actions.

The hackers are in high psychological states than other programmers as a result of having a vast knowledge. According to the psychological state of hackers they use their skills to do wrong things. But a few have allured to do good things. Hackers have their inherent culture, religion, ethnicity and nationalism. Hackers simply engage to do cybercrimes.

Scope Overview

Purpose of this paper is to identify the psychology of cybercrime in the present and future situation. The use of psychological behavior of hackers and their ability and contribution of cybercrime will be further explained. After observing the abilities and appearances of people, it is easy to predict the probability of doing a cybercrime.

Literature Review

There is a close relationship in between psychology and cybercrimes. Though many researches have been initiated about cybercrimes, a very little amount has been written about hackers; the people engaging in cybercrimes. Hackers are a group of people with high mentality. They differ from the other programmers and also high in psychological states. According to the researches people treat hackers in different ways. But there is less evidence for that.

From this research paper, it is examined about the psychological states of hackers. From that it is easy to conclude the tendency of alluring a person to do cybercrimes before he or she becomes a hacker.

Mr. Derrick J. Neufeld introduced various kind of motivation method. For example, financial gain appeared to be a motivated fact to involve in cybercrimes. According to the present situation prevails in the society, the cost of living is increasing day by day. So people with low income and high skills in the computer handling direct to involve in cybercrimes expecting a financial advantage. The above fact I one of the leading motivated method to involve in a cybercrime.

The Introduction of Cyber Crime

Cybercrime is becoming a dangerous threat. Today internet world connects with human life. Since his or her fall, crime have been related to people. Crime is still elusive and has always tried to hide itself in the face of improvements. Every country has various strategies according to their life. Because many crimes develop every day, it is difficult for cybercrime to classify crimes into different groups. All cybercrime involves the cyber space and the people provide clues from their experience. It only depends on two factors. Therefore, for can the sake of simplicity, the computer

will be considered a target or tool. For example, hacking involves information and other resources that attack a computer. Crime is a social and economic phenomenon, as old as human society.

The Reason of computer vulnerabilities**1. Lack of space to store data**

Computers have the unique ability to store data in very small spaces. This makes it easier to delete or export details using software or hardware.

2. Accessing is easy

The problem encountered in protecting computer systems from unwanted exist are due to human error and the possibility of various violation due to complex technology. Key loggers that access code can be stolen through secretly embedded logic bombs, advanced recorders; many security systems can biometric systems and bypass firewalls.

3. Complex

Computers work on operating systems, which in turn consist of millions of codes. The human mind is wrong, and no mistake can be made at any stage. Cybercrime use these spaces and enter computer systems.

4. Negligence

Carelessness is very similar to related to anthropoid behavior. Therefore, it is likely that there may be any negligence while protecting the computer system, which in turn supply cyber-crime with guide of own network.

5. Mislaying of proof

Mislaying of proof is a very ordinary issue. because all facts is often demolish. At a greater distance data hoard external surface, the territorial scope also paralyzed the criminal investigation network.

Modes and ways of committing cybercrimes**1. Email Bombing**

This hustle is to send a huge amount of mail to the sufferer, the victim may be a one person or a firm, or even a mail server, which eventually leads to a crash.

2. Data diddling

Changing the initial data before the make. When the electronics department is being computerized, the power board faces similar data problems.

3. Salami attack

Such crimes are often ubiquitous in the financial institution or in order to commit financial crimes. This type of attack does not absorb in every times. E.g. In the "Ziegler case", a logic bomb was introduced into the banking system, deducting 10 cents per account and depositing it in a specific account.

4. Denial of Service attack

Lot of unwanted request are received to victims. It can't be controlled easily. Because lot of request are affect to the computer crashes.

E.g. Amazon, Yahoo.

5. Virus attack

A virus is huge problem of day to day world. Virus are affect internal sstorage; worms do not require hosts to attach themselves. They just make their own copy of the feature and do it again until spaces are free. E.g. A Love bug virus, affecting at least 5% of computers everywhere. The loss is included in the \$10 million. The most famous worm in the world was the Internet worm that Robert Morris played on the Internet sometime in 1988. Almost the development of the Internet has completely stopped.

6. Logic bombs

These are procedures that rely on events. This means that these process are made to perform certain operations only when an event appears. E.g. even some unwanted things may be called logic bombs because they are dormant all year round and only become active on few days.

7. Trojan attacks

The term originated from the term "Trojan horse". In the present world, it called an unauthorized program that control of another device by responsible programmer but

he is actually hacker. The Trojan horse is installed via email. E.g. The Trojan horse was installed on a computer through US film director and chatted. A hacker who was installed on a computer via a webcam obtained her nude photos. He further harassed the lady.

8. Internet time theft

One person's use another person's time which is called internet time theft. This is probably famous incident identify in India. Lack of expertise police notorious made this incident.

9. Web jacking

This is called hi-jacking. In these types of attacks, a hacker can maintain another person's details. He may demolish important details from their network.. This can be used to achieve personal goals or cash. [3]

The introduction of a psychological aspect

Profile of Hacker

"Goodell (1996) there are three groups of hackers in the cyber world. They are hackers, cracker and phreakers. Cyber crimers or hackers are acquire knowledge and satisfy their curiosity. Crackers are destroy things and disfigure on web site. Manipulating and attacking the telephone system is the mainly targeted by phreakers."

According to Chandler (1996) divided hackers into four generations. First of all, the hacker generation is a smart and technology-oriented student, programmer and computer scientist from the Massachusetts Institute of Technology. They are interested in hacking about learning and career curiosity. Second generation hackers are more likely technological radically. They made a "blue box" that allowed a person to get long distance calls for free. Young people are addicted to computer games and they have own computer. In order to protect the game software from password protection, these hackers tried to find a way to break the copyright code. The fourth generation of hackers has some criminal activities caused by greed, power, revenge or other malicious intentions. [5]

Hackers have the different kind of skills and abilities. It means skills are not equal. If they want to do cyber-attack they use their own skills. Such main skills are,

- a. Monetization skills
- b. Technical skills
- c. Social skills

Technical skills are the special ability of the hackers who is talented better than programmers. Often they use these skills for developing security codes and download unauthorized personal details. The most talented hackers create raw botnets. Every botnet administrator prefers to download the existing malicious code from various internet forums.

"Social skills are as important as quantity and quality: a large number of connections with a wide variety of main outcomes of social skills is clear, but these connections must also be provided in a short period of time with minimal negotiation (in order to reduce

transaction costs) and must be sufficient reliable to avoid misconduct, mistake or failures (Tilly 2005:6)”

Cyber criminals have not been sufficiently studied. They have unique behavior, belief and lives. As well as they treat society in a different manner. However, hackers’ impression of how the community regard them. This investigation assesses hackers’ existence stories that clarify their life story, which supply a clear idea in intricacy. The focal point is on the communal deploy aberrant identity among hackers and on the meaning they allocate to their own physical existence. Why hacker do cyber criminals, interviewing the cyber attackers who have lot of experience.

Respondents mentioned that the accounts generally use computers and criminal acts involving computers. Respondents also talked about their passion and enthusiasm while describing their commitment to violations and/or other things. Omerand Alone (1997 asserts that in our minds, as many personal life as real include foreigners as possible in our thinking and personal experience that do not like ourselves and others, and we should learn from them.

Respondents use the accounts to handle various computer attacks from unreliable system to passing unwanted things. There is an example, (Conversation)

I asked, “What stupid things did you do?” then he replied,

I have relation that I dislike. What I want to do is, connect to their telephone and using their phone and then I made a unwanted call. This is very interesting real entertainment what I want. I am very happy, I can recognize they hurl the phone away when they saw the bill.” [6]

Pattern of the global cybercrime: proposed model

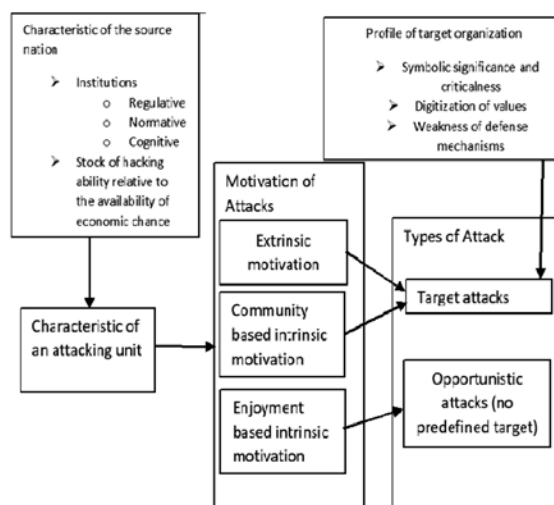


Figure 1. Understanding the pattern of the global cybercrime: a proposed framework

Following Rayan and Deci (2000: pg. 56¹) "Intrinsic motivation means that the individual's motivational simply are coming from within. The individual has the wish to carry out particular job, because its results are in granting with his faith structure or fulfills a yearning and therefore importance is attached to it. When intrinsic motivation, one can take action to deal with the fun or challenge brought about by external stimuli, stress or reward." [9]

[6] Some hackers do cyber-attack which is useful for society. That kind of cyber attackers mainly target to help community as their irresponsibleness.

This trend has also triggered "we and them" mentality, which is more due to the fact that the media is increasingly causing trend, which has led some hackers to claim that their behavior are made with fine intentions. Hackers ability to become more powerful through the use of powerful utility software, such as the Low Orbital Ion Cannon (LOIC) application, enables novice hackers to introduce valuable denial of service attacks on hacker targets. The choice of leadership. Anecdotal evidence shows that the government is very aware of the behavior of hacker organizations and has penetrated into organizations such as the United Kingdom, the United States and Europe. These secrete "web agents" whose psychological calm can be very complicated, to say the least- are believed to help arrest and prosecute active hacktivists, as seen in recent prosecutions. [8]

Different abilities are unique of cyber criminals. Psychological profiles can be uncovered through the identification of a personal emotional, mental integrity and sensitivity. [2] Crackers break that hackers build. [15] White hat hackers and Black hat hackers are different category of cybercrime fields [13] The meaning of the world called "hacking" represents rebuild of the hardware and software to change the human visual operation. Entering to the system without any permission is an essential fact to do this action, the reason of that fact is for understanding the internal performance.

Ability of understanding something is very essential for hackers in his works. [Dalal and Sharma 2007, Holt and Kiglar 2008, Shel and Melnichuk 2010] Hackers do try to learn about the systems of computers and technological complexity of program. Exploring this information is wished to win their intellectual challenges for changing or backing out the limits and their operations. Secondly, Hackers feel pleasure to winning the challenges and entire other systems. (Levi 1984; Yaar 2005) According to Hanli's study when normal people and Hackers re considered, a major difference can be seen.

1. Hacker like analytical and logical reveries more than normal people.
2. They take decision about their ability and confidence according to the experience and logical comparison.[12]

Reason for Hacking	Various Deterrence Measure
Interest/enjoyment	Possibility of being discovered
	Rules imposed by regulatory authorities
	Ban on future access to systems
Challenge	Rules imposed by regulatory authorities
Curiosity	Imprisonment
	Rules imposed by regulatory authorities
Fun	Imprisonment
Recognition by hacking community	Publicity of hacking activity
	Publicity of identity
Prestige Identify with hacking community	Publicity of hacking activity
	Fine
	Censure by profession
Financial incentives.	Publicity of hacking activity
	Publicity of identity
	Rules imposed by regulatory authorities
	Loss of job

3. Figure 2. Effect of Reason for Hacking on countermeasures must be designed to pass authentication, collaborative, filtering and prevent false information and linguistic analysis. [1] Hackers attitudes similar to cats and dog's behavior. [14] The meaning of the world called "hacking" represents rebuild of the hardware and software to change the human visual operation.

Entering to the system without any permission is an essential fact to do this action, the reason of that fact is for understanding the internal performance.

Hackers do risky work who have different kind of attitudes. They have practical mind and they do what they like. Cyber crimers are willing to resolve complex and standard problems. Also they like to do risky task and they have complex attitudes. Always hackers try to success their own work. The ability of a hacker to understand something in efficiently. [12] From the early days of schooling, a good understanding of computer skills should be provided by teacher or principal. It is helps a person to behave in a discipline. Banning hacking capabilities and web sites can help to reduce hacker's culture. [13]

Background of the Hacker

Cybercrime is a dangerous things in now days and it is hard to detect other than non-cybercrime. The damage caused by cybercrime is not just a crime without a computer. A thief who steals a credit card can get money other than a person's pocket. If one hacker destruct a bank system then that person steal not one or dozen but hundred or thousand or thousands of credit card number. Through this incident disrupt a victim's all life. (As cited in Baas, 2003)

In 21 century new tools like computers are the most important weapons of the selecting cyber criminals. (Booker and Thomson, 2001) Most of time teenagers are the offenders of cybercrime. (Stake man and Hanson, 2008). Any type of age category person are effected .Any one can do cybercrime and any person has the ability to commit crime, but when powerful people commit many crimes; they are ignored. In example Poverty, sociopathic are not to reason of doing cybercrime. (According to Sutherland).

Modern western culture itself is chaotic. This problem is evident in government policies, element of value, bankrupt and criminal statistics. (In Duffy 2001). Immoral act is not a personal issue, but it has the origin of criminal ability. Any one commits crime, he can develop positive change by not committing crime. Other than if person do immoral act and realizes that situation and he will continue, it will gain ruinous thing. Child become elder person proportionally problem become war. Parents and elders are role model of children's. If parent doesn't care about moral values it will effect to the children who will become a misbehavior person. Therefore children should not relate with this kind of parents or elders. Because children grow up with this kind of elders, society become a destructive. Other factor is watching television, seeing films in which the cybercriminal is represented as a powerful man who is very intelligent person and power to do cybercrime and through this process can easily gain income. If anyone can't be control their thoughts and emotions; it is affected to the cybercrime. Human awareness is the main function of controlling the mental illness. (Wegner 1989, Penne and Wegner 1993) Hackers think about what we fulfill among our goals. E.g. Pakistan hackers mainly focus Indian political side because revenge of Indian government.[20]

Hackers have different kind of sense and they do cyber-attacks their fun. In addition, cyber-attacks typically involve multiple phases. Preliminary survey of system arrangement and presence followed by some method of invasion. [21] Cognitive hackers control people idea and they get actions in quick manner, therefore cognitive hackers have super talent for the hacking and they used their satisfaction. The one of important fact is Naveen has 19 years old boy so this is the initial step to starting hackers activity. Cognitive hackers have capable of man power and they know how to hack personal computer, the special thing is cognitive hackers identify what is the beneficial side of this incident and what is the threat and we ignore them. Cognitive hackers recognize early what it will happen.

Hackers live in a social world, and contact with parents, teachers, and friends often affects ideas and behaviors. However, hackers also live in the virtual world, and government authority and information ownership are actively questioned. The virtual world described by Halbert (1997) is "an invisible community with complex and unrelated lifestyles, early anti-authoritarian political consciousness, dependent on reciprocity norms, complex socialization, rituals, information sharing networks and A clear value system (p. 364) "lives in their isolated virtual vocabulary, making it easy for them to defend their actions.

Single Source Hacking

The people have no own source of the have not same topic in the cognitive hacking process. The cyber criminals `try to return a made their own counterfeit as the real web page.

Combatting cognitive cybercriminal need either protecting unreliable access to data

assets and identify people behavior. Protection is very difficult because initial step of hackers beginning is very amazing therefore verifying is very complex because of the cognitive hackers can identify what is next threat what we will have to face in every time. Every time hackers involve unauthorized access to get information.

Cognitive cybercriminal Need new measurement helping this one in a good way because hacking which is very dangerous happen in the today world.

When we considering the crime; we ask questions for recognizing the crime case,

- Where was the incident happen?
- What is the date of crime case?
- Whether Physical crime is organized or not?
- What is the stage of physical crime?
- Any identification in the physical crime?

Now we translate the physical crime in to the cyber world; what are the questions that we include

- Whether crime is straight or not?
- How to group cybercriminal within the scenario?
- What is the possible relationship among the desktop and process? Could I open a guesswork about subtypes?
- Is there any evidence to establish a sub type?[19]

What hacker is doing

Hackers get access in primarily stage therefore it is very dangerous incident because if hacker access the large system; the destruction is very high. Making problem and accessing internally is the main goal of the root kit hackers. Therefore hackers easily establish and growing with large system. Is gain golden opportunities. Root kit is very wicked and they hide their details also therefore identification of rootkit hackers are very difficult. [18]

Which kind of hackers doing cyber crime

Now I am going to talk about inside attack around insiders. Internal hackers are other group of people in the hacker world. This hackers have high power to enter the internally system. That is the main benefits of hacker's side but not to user side. Internal hackers can enter the system without any problem because they are the very reliable person of the company. So they can get access authorized manner. Research aim to internal hackers because they account for a large portion of privacy infringements, including misappropriation of funds, theft secret, customers who are theft ,important factors and illegal activities ,which can also lead to significant loss; compared with general attackers, spiteful attackers have the ability to cause harm to the company. Normal expenses of internal staff attack is \$8 million twelve month period. However the consequences of violation can control to large period of patron.

What prompted insiders to launch an attack

- Needs of exploratory therapy
- Minus income
- Downgrade

- Gambling accounts
- Maximization of credit card

Black hat hackers, white hat hackers and grey hat



hackers have different kind of behavior. So this is the profile of three kind of hacker's psychological description.

White hat hackers are most of time ethical hackers who have responsible for detecting security system and fix it. They help to good thing.

Grey hat hackers have positive mind and they are self-motivators. They against do political campaign. If person or organization doesn't like to stable policy which is referred as Hacktivists.

Black hat hackers do cybercrime. They involve with illegal activities. Their bad behaviors used to revenge and search illegal information etc.

White hatters are Narcissists. Grey hatters and black hatters are not narcissism which is interesting thing in the cyber world and it was not notable.

Reliable person are the dangerous human in an organization. Who are the threaten of organization. Spread bad strategies, shamming, Destruct important factors of the company this is the main incident in organization. [17]

Hackers always sitting next to you

A person who have greasy hair and red eye is a normal person but if we deeply studied his behavior who is the secret person in the company. He always sitting in his office chair and always work with his personal computer that is the uncommon behavior of this person. This is not normal situation; this person shows his abnormal attitudes. These are the attitudes of person who is become hacker.

Sometime people saying that poverty is the reason that person is became hacker. However Poverty is lead person therefore people focus bad activities without any doing. Most of time funny person attract to hacking. They want to do something without any effort. Revenge and spying are the main reason of the doing cyber-crime.

Model of hacker profile

The survey of 546 people and get their feedback to identify which kind of environment that they have to make hacking.

Gender	Total	Percentage
Female	218	39.9%
Male	322	59.0%
Unknown	6	1.1%
Total	546	100.0%

Age	Total	Percentage
Under 25	325	59.5%
25-34	153	28.0%
35-44	40	7.3%
45-54	18	3.3%
55-64	4	0.7%
Unknown	6	1.1%
Total	546	100.0%
Mean	25.81	

Level of Education	Total	Percentage
Not completed high school	8	1.5%
Completed High school	359	65.8%
Undergraduate degree	136	24.9%
Graduate degree	39	7.1%
(blank)	4	0.7%
Total	546	100.0%

Profession	Total	Percentage
Computer user	350	64.1%
Computer Professional	188	34.44%
Unknown	8	1.5%
Total	546	100.0%

Type	Total	Percentage
Blackhat(Hacker)	30	5.5%
Former Blackhat	31	5.7%
Whitehat	217	39.9%
Nohat	266	48.7%
Unknown	2	0.4%
Total	546	100.0%

Who he is?

Cyber-criminal is a cognitive happenings that requires special skills and reasoning skills. As a cognitive process, hacker needs special skills and reasoning skills its shows hackers behavior and their logical ability .If we consider their capability they are the one who is thinking in different manner. [16]

Personality: Hackers personality is very simple which says their uncomplicated life. They like to enjoy well in life and they do something but others not to do this kind of activities; because it is illegal activity not legal. Cyber criminals enjoy in own way using hacking process. They gain more thrill and experience without contravening. But trying is the best exercise that is used for cyber-attack and it is gain hackers successes. Attitudes, walking style, outfit, nourishment and traits also very simple.

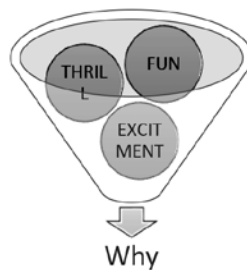
But their external behavior is complicated. Begin of the he start finding new method to access unauthorized system and doing various experiment. So therefore he always sitting in front of the personal computer. Most of time their job is also IT industry. They always try to find software field profession because every day they can involve to hacking activity and practice it. Anyone cannot identify what he is doing. His occupation also software engineer.

Capabilities of cyber criminal

Hackers are the amazing people in the world. Because their thinking ability is very demanded which acquire many benefits. However most of time when we consider person who is very educated,

- Very intelligent,
- Have money (not a more money),
- Have technical knowledge
- Deep perception

Deep perception mean they are think different manner when we compare normal person we can't recognize whether he is a hacker or not.



- ✓ To fix Relationship-*"I'm not important and no one is looking for me."*
- ✓ Find happiness.
- ✓ Conquer fear-*"I don't have anything anyone would want."*
- ✓ Overcome addiction-*"If I want to stop but I couldn't do that"*
- ✓ To improve career path

The Orientation of Hacker's Weaknesses

Hackers have complex abilities. They have bad handwriting. Their habit of letters are like block letter printing. Impatient, Intellectual arrogance and lack of identifying emotional feelings, Lack of communication ability. [14] Crackers are lazy people not like hackers. [15]

Discussion

Cybercrime is a dangerous factor in today world and parallel growing the use of internet. This research examines a hacker's psychological [8] behavior of good and bad side. According to the hacker's ability, knowledge and their education background which is going to be predicted about human before becoming a hacker. The proposed framework is a systemic model that supply decision makers with a complete vision for cybercrime psychology and behavior. Various kind of motivation factors which hackers are motivated. They are intrinsic motivation and extrinsic motivation. For the hacker, cybercriminal is a new form of a new entertainment basis. [5] A person who breaks into another person's computer system to intend by crackers. Hackers write program not like other programmers. Hacker's program codes are very powerful not like general programmer's code. Developing things are major function of hacker's schedule. [11]

Conclusion

Hackers who have done cybercrime has psychological affect. May be it is mental illness. Cybercrime cannot be eliminated from society, but it is very likely to check them. Mental illness leads to deviations associated with psychological, emotional and biological factors. Government and business sector policies and programmers strengthen mental health. Employment, education, justice, a peaceful environment, housing and welfare, and specific activities in the health field related to the treatment of mental illness are also included in this issues.

But Cyber crimer have three kind of aspects. They are Psychological aspects, Behavioral aspects and Social effect. Psychologically they get more thrill doing cybercrime. Conquer fear is getting hacker. Additionally there are some reason is effected to person who is became a hacker. External pressure and internal pressure; society is the witness of the cyber world not hacker because if hacker do cyber-attack which depend on hackers' perception. Other than that Personality, Intelligence and generic habits.

Prediction is goes to person external factors because as a human we can easily identify person behavior other than external factors. Therefore person who is well educated, dedicated their time for profession; profession is Software engineer, simple life and complete quit is more probability to do hack .when think External appearance is not attractive and peaceful which are the thing for measuring person whether who is a hacker or not. That is my main objective of research. I think appearance and behavior is shown persons' outer. So then can be measure next what he is going to do.

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References

- [1] G. Cybenko, "Cognitive hacking: A Battle for the mind," September 2002.
- [2] S. F. & N. Bardyn, "Algorithm of the cyber criminals identification," Global Institute for Research & Education, July August 2013.
- [3] S. H.Chan, "An Empirical Investigation of Hacking Behavior," vol. 9, no. 4, pp. 41-58, January 2005.
- [4] K. Dashora, "Cyber crime in the society," vol. 3, pp. 249-259, 2011.
- [5] H.-J. Woo, "The Hacker Mentality," 2003.
- [6] O. T. -Goldschmidt, "Social Science computer review(Hackers' Accounts: Hacking as a Social Entertainment)," Social Science Computer review, pp. 8-21, 2005.
- [7] N. Khatri, "Pattern of global war and crime," pp. 541-562, 2005.
- [8] O. T. -Goldschmidt, "Meaning that Hackers Assign to their Being a Hacker," vol. 2(2), pp. 382-395, July- December 2008.
- [9] S. Gold, "Get your head around hacker psychology," Information Technology Cyber Security, February 2014.
- [10] K. R. L. a. R. G. Wolf, "Why Hackers Do What They Do: Understanding Motivation Effort in Free/Open Source Software Projects," MIT Solan School of Management, Boston, 2005.
- [11] N. B. Sukhai, "Hacking and Cybercrime".
- [12] M. Bachmann, "The Risk Propensity and Rationality of Computer Hackers," International Journal of Cyber Criminology, vol. 4, no. 1&2, pp. 643-656, July 2010 December.
- [13] R. Sharma, "Peeping into a Hacker's Mind: Can Criminological Theories Explain Hacking?," National Law University Jodhpur, Jodhpur, July 12, 2007.
- [14] W. Z. Christian S. Fotinger, "Understanding a hacker's mind-A psychological insight into the hijacking of identities," Austria.
- [15] E. Raymond, "How to become a Hacker," Database and Network Journal, p. 22, 2003.
- [16] N. L. Beebe and J. Guynes, 'A Model for Predicting Hacker Behavior', p. 12, 2006
- [17] G. L. Sanders, S. Upadhyaya, and X. Wang, 'Inside the Insider', IEEE ENGINEERING MANAGEMENT REVIEW, vol. 47, no. 2, p. 8, 2019.

- [18] D. Geer, 'Hackers Get to the Root of the Problem', *Computer*, vol. 39, no. 5, pp. 17–19, May 2006.
- [19] P. Stephenson and R. Walter, 'Cyber Crime Assessment', p. 10.
- [20] S. Kabeer and M. U. Shaikh, 'The Relationship between Cyber Crime and Mental Illness', p. 5.
- [21] S. J. Yang, J. Holsopple, and M. Sudit, 'Evaluating Threat Assessment for Multi-Stage Cyber Attacks', p. 7.
- [22] Cyber Identity: Salient Trait Ontology and Computational Framework to Aid in Solving Cybercrime', p. 8.

Use of IoT with Smart College System

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Abstract

The current learning system has undergone many changes and improvements with the advent of technology. The use of IoT is one of the major steps taken in the field of technological advancements by humans. IoT use is the one of the huge step humans are kept. IoT is used for educational purposes ,especially in universities for higher education. “smart education” system is the trending topic then and now. smart college, smart university, smart campus words imply the same meaning when discussing on the following topic. The objective of this article is focused on smart college ,smart university system connected with IoT. dynamic changes and collaborations with regard to IoT equipment's interior and discussions the relevant IoT-based(smart) campus and systems are further studied throughout the course of this paper. Here the discussions are aimed about temperature, super sensors' RFIED and the integration of those modules to build a proposed prototype. The street 'lighting system and smart grid system are the major research areas that are happening today.

Here the discussion is mainly about the features of a smart college system, advantages disadvantages, limitations, barriers are to be discussed. We describe the challenges and problems some ideas and future research on how to develop. Finally, we consider the architecture of the campus, design of the future smart campus also mobility with other infrastructure.

Keywords

Internet of things, smart college, smart university, smart campus, clouds computing, sensors

Introduction

“ICT can be used to fix and increase the quality of learning process, research, library, information services and university management. One of the ICT implementations is the using of internet technology that is integrated to all of things of day today life, that is called as Internet of Things(IoT)” [6] .When considering smart college system, it is the most important thing .because education is main investment in the country for the development .In the world education and IoT became huge step from the developing technology.[2]use of IoT and usage of IoT in universities for the learning and teaching system. Today there are lot of challenges having face. Different way to learning with IoT can collaborate all of learning way in one path. teaching becomes unconcerned because in many institute's modern infrastructures is fallible, especially in Asian countries and developing countries. Therefore , this increased more advantages student's studies and bring new opportunities for learning .The concept of smart campus or smart college system already being developed in some developed countries .Here objectives are to

create easily shareable notes share the documents audio video for the effective learning for the students wants. Here describe some authors are implemented some prototypes. also IOT enabled resources and smart university case studies revealed the usage of this concept in the world. Consider this keep it future and given to the best experience within learning environment.

Overview of the smart college system

The concept of smart college system is the define like a small world where sensors enable, and network devices work continuously and collaborate each of then inherently lives become more comfortable from it.all objects can be transformed into smart object by

attaching several sensors specially RFIED. “Primary focus of smart e-campus is in the education area, but they also drive the change in other aspects such as management, safety, & environmental protection. The availability of newer technology reflects on how the relevant processes should be performed in the rapidly changing digital era.” [2] there are some complex objects can be converted into smart objects.

The smart college system concept intended to is effectively used to sense small microchips, QR sensors, RFID tags inside the every devices and those create huge difference among activities. How they react, response and observe are checking as well. Also smart classroom consist of enhanced the data sharing between devices, instead traditional class room smart classroom with IoT; it collect data for e-learning application. The IoT platform include of 3 major fragmented a sensors node, a cloud server, and an android bases mobile app. All things that mentioned some functions are interrelated with the sever can be monitor and most suitable actions want to be required.

Smart university/campus concept in general form is the that is connected to the internet via smart objects; that means of IoT. There are many objects have to connected and imply those objects.

Asa an example printers, projectors, doors, tables, labs, parking & entire building can be mentioned. “considering about learning ability’s students, they have better chances get from this .these leaning facilities are converted to the positive way via IoT. Many students having who have demonstrated some reading problems, mild, severe which complicate instructions .characteristic having speech and language impairments, it depending an vary with the type of impairments involved.”[19]

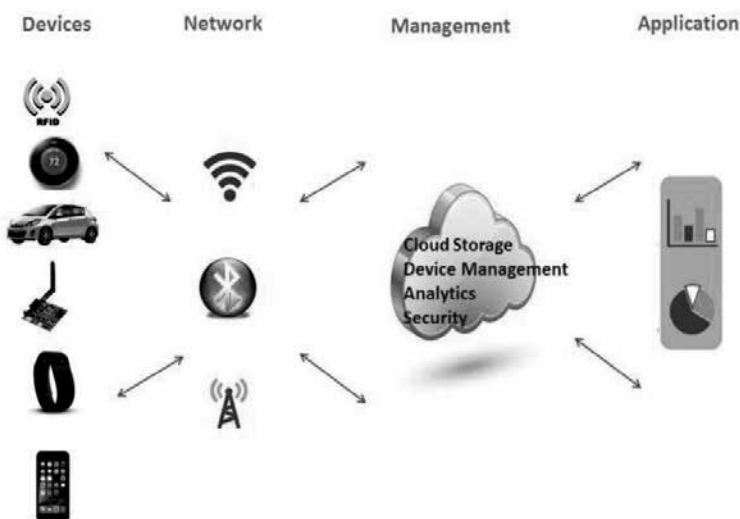


Figure 1 smart inventory of e-campus

General context of smart college system all objects are connected to the internet each there are similar objects that can be convert into small objects within IoT in the university. Create collaborate learning environment, attractive classroom with a greater number of students easy to make virtual in single classroom , all in one place. The important feature of the smart e-learning is easily and strong bound with learning platform .Smart college system concept creates as the revolution of the current learning system.it bring huge advantages and connect with IoT.

Usage of this concept and people who are trying to implement it in different ways. following describe those practical situations developers had done. University information, emergency contacts, notification, smart canteen, smart library, smart lighting, security and safety management system. campus gives best facilities to students, departments, staff, guest, admin and management authorities .it is the more in an adjustable, and speedy & on-time delivery of responses.

A. Student counting system within classroom setting

This concept explains using a system of manually recording names on paper or non-technological approach. it could be showing a student's attendance work within RFID system along with the face recognition.

B. Managing & proper allocation the Classroom Environment

The light needs to have a wireless sensor network, working together Lux sensors that light ensure the darker days, this light intensity known as illuminance. This light can be applied to save energy. Temperature reading by Node MCU and transmitted through Wi-Fi.

C. Implementation of smart Information system

Smart information system provides various features connecting with mobile application and devices. IoT archiving and transforming the monitored data send to cloud servers. database is acquired on the mobile devices by clicking android app. home, login notification, emergency contact is included this application.

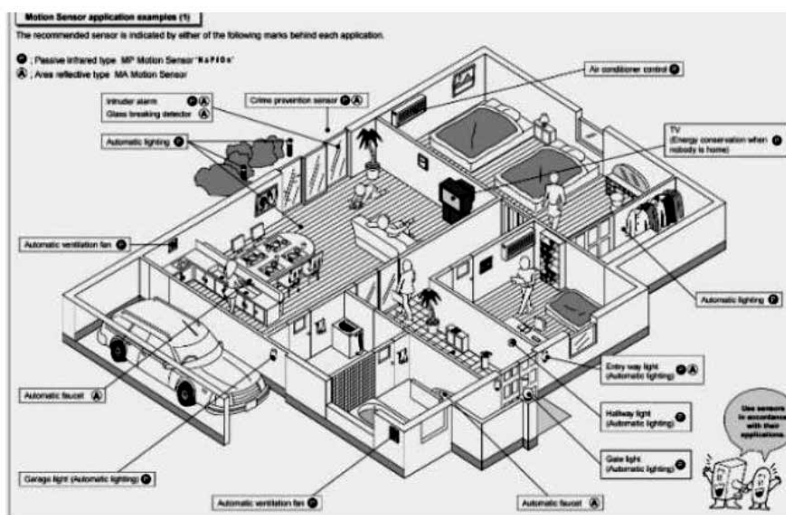
D. Smart temperature monitoring system

This system implements to monitor & measure temperature in the server rooms, labs, library, security system to ensure the safety of the operation. S sensors nodes are sent to the cloud server in online database.in case of emergency send notification alert retrieve on the DB.

E. Library management system

Smart Library management system is integrated with an Android application that is installed in all the student's smart phone. This app will inform all about the students records and borrow books details and available books from library. RFID tags combine with the smart phone. library card system can connect other physical objects. User can request from anywhere through GPS technology which recourses need.it can be a mobile application, new modes can realize the concept.

Following figure shows the prototype of sensors enabled in classroom.



Major research in use internet of things for the smart college system

Major researches are under this topic; The concept of smart college system, further more smart college concept can be enlarge beyond this in future. Consider the major research are under this topic such as some researchers are found and implemented prototypes of this concept. Smart campus theme come as merge of the following smart things together in single unit like following.

- Smart E-learning application with IoT
- IoT sensors connected mobile infrastructure
- Smart IoT enabled classroom
- IoT based Wi-Fi, mobile hotspot for (university)campus
- Smart IoT enabled LAB room
- IoT sensors for records and document sharing

here use some sensors for the implementation. QR code or RFID tag is the major objectives of them.

Under those things are the implementation of the smart university system. major researches are the smart college system having some plans for the future and more suitable directions are the expand this topic. One of the most important smart objects is the university is a “classroom”. Classroom can be communicated directly with student’s ad lecture. similar object on the digital campus departments student admin’s need to worry about the location, space and time. The institution, campuses are used collaborating tools especially video open lectures towards the student. Also, when student have ill, or bad weather then can participate the live lectures from laptops or other devices. to more students’ approach for the system and authenticated and checking, monitor the system and updating the relevant information. Institution Index number, user Identification no, passwords, results, grades of the relevant subjects etc. IoT has the system of physical things, vehicles, sensors, equipment’s as different things installed with hardware, software and empower the items including their trade information. Type of sensors are used for the various uses, Environment, security, safety is the process that are considering.

The major problem considered here is how different services can be adapted into campuses/colleges which is heterogeneity of systems and technologies that they use. here aim is increasing productivity in campus, beyond that we can save our valuable time, energy and money, making it easy for all people present in campus.

Application of IoT

“SMART campus having lot of equipment’s and objects. of all the components of these developments’ areas, most advanced projects are focused on human needs and wants. Smart home smart city, security system, smart parking system, lightning system domain on public services. All these services can be applied for the university system.”. [10]. Finally, here discuss about absolute important design and challenges that should be accepted for the create and realize into a smart university. The proposed system describes the effectively use with micro devices and

create interconnect data another device smart classroom enhanced the collect data accurately. Discussing about the concepts smart home, smart city concepts having same method which are used here. It acts like a Smart alert system, smart grid, LAB rooms are available and proposed system Here in the University the system is connected to the University ER. also, system realized smart street lightning system using IR sensors. It depends on the movement. also, smart paring and smart grading, smart air, quality is these of environments become enhance the quality of the educational structure and beyond the traditional attitude. Also, to improve the performances, and speed of both teachers and students. Following figure 2 describe about the applications are use in the

university. Within electronics media and raspberry PI is the common use for the gateway. Smart attendance system track the RFID tag and sensors, then it time and resources save also other system also provide the secured and access control node.[15].implement those infrastructure have to structured architecture, following IaaS (Infrastructure as a Service), PaaS, SaaS (Software as a Service) consider as the architecture.

When constructing green campus within IoT architecture is entirely the same smart college system. The mission that can be achieve towards the vision. It is completing the IoT environment with the human involvement [24]

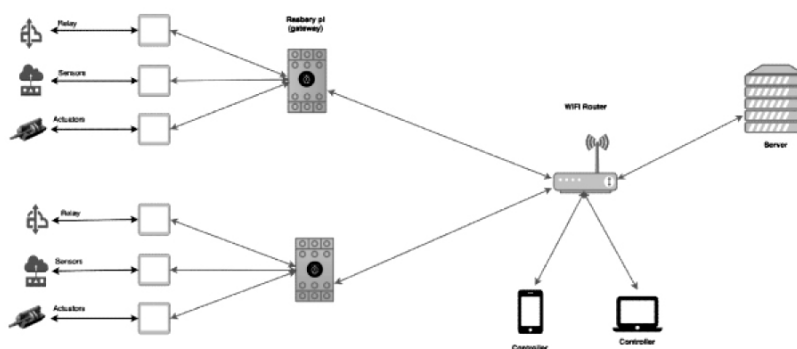
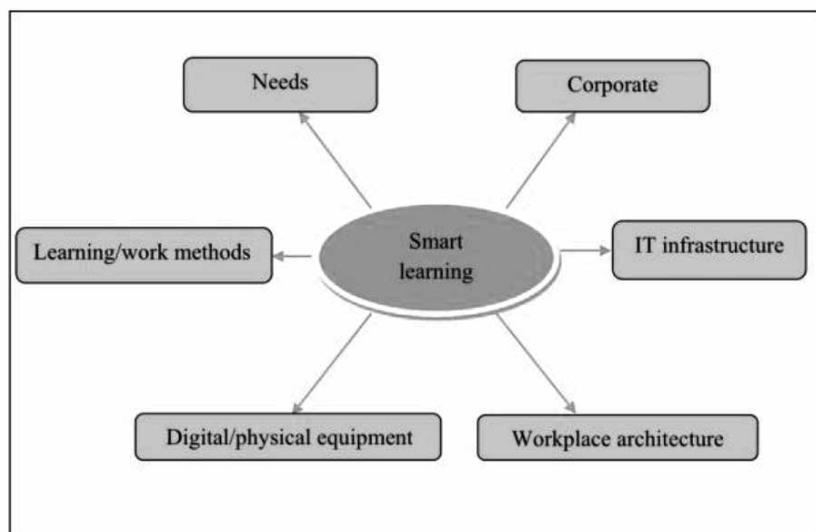


Figure 3 application of IoT in university

Future direction of IoT for smart college system

Future direction of smart college system is the development of current system adding multiple features are updatable.

In future, most of the researchers are trying to do it realize. Here furthermore plan to (develop) implement IoT infrastructure for the smart university. Security is the huge and important fact that proposed system. Campus environment integrating the different applications use IoT. In future security issues avoid from design Security system. This security architecture that above discussed, it will work for future and to integrate a solution for the various types of security problems, also it differs from the different places authorized access and network connections are barrier and prohibited to access. Also, the challenges and opportunities having to solving. Technical, political financial obstacles are facing as challenges. Also, some parameters dependent on capabilities of the land and related universities. So, need of the acknowledgment how to maintain and use smart campus infrastructure. Internet of things having feedback because to evaluate the administration system. eLearning will be integrating to that I-Campus System. "that is provide the best e learning application simple also unified gives a network rapidly changing effective process [12] Cloud computing is import to the for system, to integrate the smart campus use grid computing, computing, virtualization is balances technology Following figure showing the major areas for utilizing the IoT in SMART LEARNING system.



“every university are looking future the potential of IoT technology. In Future, this system will be enhanced adding the proximity sensors and fire sensors to realize the comprehensive smart campus. this is obvious learning and education will be cultivated rapid transformation connecting all of us. potential and handling smart campus and accessible devices by doing ideal connectivity in e learning with IOT learning for academics “[12]. IoT uses various networks for making common network and reduce power consumption, offering less expensive wireless system.

Discussion

As discussed in this study of smart college system one of the major inventions happened in other education field. smart college system having lot of equipment's. Benefits of the smart college system have broad scope it is not easy to handle. Because students are not familiar with use of IoT. Then want to acknowledge people for that. Smart campus architecture having around 6 services. smart card system, smart park, smart class (virtual classroom) smart lighting, environmental analyzing, automation, smart waste management, smart microgrid. such a services are related to smart campus.

This smart college system having aim & objects also having advantages and limitation, challengers.

	Title of the Research Paper	Aim & Problem(s) addressed	Limitations / challenges	Future Directions
1	"SMART COLLEGE"- Study of Social Network and IoT Convergence	This concept related to social Internet of things. IoT for human to machine. propose that paper to. Establish the smart college environment leading to SIoT	process the information given by the other members lack of essential trust management	Increase the efficient communication of the objects
2	A Survey on Internet of Things Enabled Smart Campus Applications	here is purpose of the build the IoT technologies and build the modular approach smart campus	Improve the quality of environment Limited smart campus application adopts to IoT devices	Improve the existing electric power system, generation delivery utilization
3	An Internet of things Approach for Developing a Smart university	smart university system integrates the broad technologies. lighting library system, parking etc.	Huge investments, lack of convenience lack of interest of studies	smart health systems, Data analysis, of that the sensors electric vehicle charging stations, smart laboratories,
4	An internet of things Based Secured Smart e-Campus	paper build a secured e-campus. for student's administrators, lectures data are kept safety and easily identifying	Difficult achieve more area because should occur huge cost	future make changes for students in highly enabled IoT. Starting from needs
5	Smart Campus System using IoT	comprehensive overview to the create smart university enabling the sensors and network	Resources depending on actual implementation and occur high energy consumption to build the automated monitoring system	using wireless communication for different user

6	Smart University, a new concept in the IoT	wireless and mobile platform describe the concept of IoT with smart	Illegal parking, lack of electric power	More comfortable and collaborate to make inhabitation
7	IOT enabled Futures Smart Campus with effective E-Learning : smart Campus	of the iot for the college system and how to use e-learning for academics. changes for students' abilities and highly enable IoT campus environment	visualize hard to capture a smart university	Multiple classroom sensing and sharing notes through it. multi-servers will largely distributed
8	Towards a Smart Campus with Mobile SIoT (Social Internet of thing) & Social Networking	Here presents an architecture to demo and deployed of mobile social networking and the how- to system is developed & having application for mobility & network connection	Hard to support multiple service at one time Send the data different network and conflict among them.	Demonstrate the architecture effective and efficient way
9	On Study of Building Smart Campus under Conditions of Cloud Computing and Internet of Things	of Smart Campus Development t going to use both of concept cloud computing and IoT. this research paper discuss about 2 new concepts are use both together.	Complex to handle large amount of data, Adopting the virtualization	Same campus monitoring for the real time data
10	A Graph Model of Heterogeneous IoT Data Representation: A Case Study from Smart Campus Management	propose a graph model for constructing a graph database of heterogeneous IoT data. Graph databases are purposely built to store data with nodes.	There are use several graphs to represent the data. Pre-acknowledgment should need to identify three types of nodes and fourteen types of edges.	Here given a query is supported by most graph query languages. use Cypher - a declarative query language for development.

11	Internet of Things for a smart campus: on-line monitoring of water consumption in university Building	Here proposed a monitoring system based on the Internet of Things (IoT), consisting in a network of physical sensors.	Hardly Measure the water limitation and consume rage	create social relationships devices or objects that visit the same geographical area
12	IoT and Wireless Sensor Network Monitoring for Campus Security	Here the idea is to the smart campus monitoring. because the popularity. Connecting wireless network and nodes, sensors create to the system properly also, secure routine algorithm	Wireless sensors are helpless for several varieties of attacks	1. will give associate energy-efficient mechanism victimization pre-allocation 2. the analysis of the key technologies should be performed
13	IoT Solution for Data Sensing in a Smart Campus using Smart phone Sensors	This paper intended to android os as a manage operate the various sensors embedded with smart phones. Discussed the architecture, detail description of modules.	More cost to occur data sensing network Should purchase some application	Use of the computational architecture for future

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References

- [1] Madhura Rao, Neetha, Rao Swathi , " An IoT Based smart campus system " International journal of humanaties and social science invention
- [2] Shivaraj kumar T.H, Sriraksha T.A, Noor U saba , " An IOT Based Secured Smart e-Campus " International Journal of Humanities and Social Science Invention |Volume 6 Issue 3 ;March. 2017
- [3] Madhura Rao, Neetha, Rao Swathi, Sneha M, Shannon Kotian, Nagaraja Rao , "An IoT Based Smart Campus System" , International Journal of Scientific & Engineering Research Volume 9, Issue 4
- [4] Abdelrahman Abuarqoub, Mohammad Hammoudeh, Diaa Uliyan, Mudhafar Al-Jarrah "A Survey on Internet of Things Enabled Smart Campus Applications " , 17, July 19-20, 2017, Cambridge, United Kingdom
- [5] Veeramanickam Murugappan, Debnath Bhattacharyya and Tai-hoon Kim , "Reserch Study on Significance of Gamification Learning and i-Campus Using Internet of Things Technology-Enabled Infrastructure"
- [6] Marti Widya sari, Prahenusha wahya ciptadi, R. halfid hardyanto, "Study of smart campus developments internet of things technology", 2017 Material science and engineering conference
- [7] karan phougat, Mohit Sinha, samarth pruthi, sachin B wakurdekar, " An IoT approach for developing a smart campus " , International Journal of Innovative Research in Computer and Communication Engineering, Vol. 5, Issue 4, April 2017
- [8] Dr. kamleesha sharma, Dr. T.Suryakanthi, "Smart System :IoT for University" , 2015 International Conference on green computing
- [9] Zhiwen yu, Yunji Liang ,Bukan Xu, Yue Yang , "The Increasing Presence of IoT and How to Prepare Your College Campus"
- [10] PhD student Marian Cata,Doctorarl , School on automatic control and computers, university Politehnica , "Smart University, a new concept in the Internet of things", 2015 14th RoEduNet International conference-networking in Educational research. 24-26 Sept. 2015
- [11] Snehal K. Dixit, S.M. Kulkarni , "Smart campus system using IoT" , International journal of Advanced research in science and engineering , vol No.6, issue no. 8, august 2017
- [12] M.R.M.Veeramanickam, Dr.M.Mohanapriya, "IOT enabled Futures Smart campus with effective E-learning ;I- campus" , GSTF Journal of Engineering Technology (JET) Vol.3 No.4, April 2017.

- [13] Jeffrey P. Bakken, Vladimir L. Uskov, Archana Penumatsa and Aishwarya Doddapaneni Smart Universities, "Smart Classrooms and Students with Disabilities" Springer International Publishing Switzerland 2016, Smart Education and e-Learning 2016
- [14] M.pruthvi, S.Karthika,N.Bhalaji, "SMART COLLEGE"- Study of Social Network and IoT Convergence", Second International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)
- [15] Thota Narendrakumar,Anhi s. Pillai , " Smart connected campus", 2017 international conference on Intelligent computing instrumentation & control Technologies
- [16] Chao Huang , Liuzhou City Vocational College, China, "On Study of Building Smart Campus under Conditions of Cloud Computing and Internet of Things" , Chao Huang 2017 IOP Conf. Ser.: Earth Environ. Sci. 100 012118
- [17] Zhiwen yu,Yunji Liang ,Bukan Xu,Yue Yang,Bin Guo, "Towards a Smart Campus with Mobile Social Networking", 2011 IEEE International Conferences on Internet of Things, and Cyber, Physical and Social Computing.
- [18] Abdullah Alghamdi,Schin Shetty , "Survey Toward a Smart Campus Using the Internet of Things", Conference Paper · August 2016
- [19] Jeffery p.bakken Vladimir L. Uskov, Archana Penumatsa and Aishwarya Doddapaneni ,"Smart Universities, Smart Classrooms and Students with Disabilities", Smart Education and e-Learning 2016, Smart Innovation, Systems and Technologies 59,
- [20] Jaime Alonso*, Carlos Bayona, Omar Rojas, Marco Ter´an, Juan Aranda*, Henry Carrillo*, Carlos Parra, "IoT Solution for Data Sensing in a Smart Campus using Smartphone Sensors" , Conference Paper · May-2018.
- [21] Ahmed Mateen, Qingsheng Zhu, Salman Afsar and Muhammad Usman, "IoT and Wireless Sensor Network Monitoring for Campus Security", The Journal of The Institute of Internet, Broadcasting and Communication (IIBC) Vol. 18, No. 6
- [22] Yongliang Liu , ,Weihong Zhang,b ,and Peng Dong , "IoT Solution for Data Sensing in a Smart Campus using Smartphone Sensors", Applied Mechanics and Materials Vols. 543-547.
- [23] Antonio santos sanchez, karla patricia santos oliverira. "Internet of Things for a smart campus :on-line monitoring of water consumption in university Building" , International Journal of Engineering research & Technology.
- [24] Van-Quyet Nguyen, Huu-Duy Nguyen, Giang-Truong Nguyen, Kyungbaek Kim, "A Graph Model of Heterogeneous IoT Data Representation : A Case Study from Smart Campus Management", National Research Foundation of Korea (NRF).

[25] Hsing-IWang , “Constructing the Green Campus within the Internet of Things Architecture”, International Journal of Distributed Sensor Networks Volume 2014, Article ID 804627, 8 pages

[26] Xiao Nie , “Constructing Smart Campus Based on the Cloud Computing Platform and the Internet of Things” , 2nd International Conference on Computer Science and Electronics Engineering (ICCSEE 2013).

[27] Jaime Alonso, Carlos Bayona, Omar Rojas, Marco Ter´an, Juan Aranda, Henry Carrillo, Carlos Parra, “IoT Solution for Data Sensing in a Smart Campus using Smartphone Sensors”, Conference Paper. May 2018

A systematic review on modern recruitment strategies: A qualitative study

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Abstract

Better recruitment strategies result in improved organizational outcomes. With reference to this context, the research paper entitled explore modern Recruitment based on exiting sources. Selection has been prepared to put a light on Recruitment and Selection process. The main objective is to identify contempory recruitment sources and to examine the modern strategies for recruitment in organization. Successful recruitment and selection practices are key components at the entry point of human resources in any organization .The study also focus its attention to determine what the modern recruitment practices available are and provide some suggestions that can help for organization and needy people. Non probability sampling has been used for this study, purposive sampling method is selected and 15 articles are used for this study. Data analysis has been done with thematic way by using PRISMA Approach. Based on this study modern key recruitment strategies identified: E-recruitment, Application of equality, Online based recruitment system ,Social media recruitment (Facebook), Psychological assessments, E-HR mechanisms ,Recruitment through Corporate websites, AI-based recruitment system, Applicant Tracking Software (ATS) and Professional networks (LinkedIn).

Keywords

Recruitment, AI: Artificial Intelligence, Social media Recruitment, E-HRM

Introduction

Recruitment is a process of finding prospective employee and stimulate them to apply for their vacancies in the organization. Recruitment is the central function of human resource management. Finding the right candidate for the right job is the one of major objectives expected to achieve by any organization. Recruitment process consists with the activities of analyzing the recruitments of a job, attracting employees, screening and selecting, and hiring. Recruitment strategies help to implement managerial functions in an active mood (Kapur, 2018). The quality of the recruitment strategies and techniques influence to select the right person, for the right position at the right time. Even today many companies are still using traditional recruiting through newspapers. Apart from that, use of employment exchange boards, employee referrals, online job portals are also used. However, these recruit methods are still adequate to hire the right candidate. But when considering current scenarios in the world, recruitment methods have been changed with the diffusion of internet technologies. Today, technology plays a critical role in recruitment; that supports to not only apply for jobs easier but also it facilitates to find qualified candidates anywhere in the world (Sambamoorthy, 2019).

E-recruitment

Online platforms are being increasingly gaining popular as the main source of recruitments in large number of organizations (Harky, 2018). Recruiters in current scenario competes to earn competitive advantages in acquiring skilled people fit with the organizational needs.

Companies use their world wide web to advertise the vacancies and apply such vacancies via webpages of the company. The reasons behind the use of E-recruitment by large number of companies are saving resources in terms of cost, time and efforts when comparison with traditional recruit methods, and no intermediaries required. The process of screening large number of candidate resumes has been facilitated by the artificial intelligence (Sambamoorthy, 2019). The artificial intelligence is allowed to screen suitable candidates by matching their job description with the resumes thus it ensures that there is no unsuitable candidate screened. Hence, these processes would be able to implement in more quicker and efficient manner by the organizations.

Research problem

Companies are increasingly adopting the innovations with the changing technological world to go towards success and growth of the company. In any type of organization, recruitment process is considered as more critical part indeed that helps to find and attract the right candidates for their jobs. Organizations put into practice recruitment strategies and techniques which enable to achieve strategic goals and objectives. The importance of recruitment is recognized by the company's satisfaction with the most productive employees. Also, it raises overall productivity and profitability of the organization and encourage good employee and employer relationships as well. Recruitment is critical towards success and growth of the organization. Moreover, recruitment strategies enable effective and efficient implementation of managerial functions in an organization. Hence, it is necessary to implement effective and appropriate recruitment strategies within the organizational structure. Having right employee base enables an employer to go for next level of the growth and success. That is why recruitment is considered as one of critical stages in human resource management process which allows to attract and use best employee strengths towards attaining the organizational goals and objectives. But many companies don't know benefits of implementing right recruitment strategies thus do not lead sufficient efforts to do it. As a result considerable number of perfect employees are out the organizations.

Therefore, present study aims "To examine the modern strategies for recruitment in organizations".

This does not mean that companies should completely avoid the use of traditional methods, but the companies can gain more results with the blend of modern recruitment techniques.

Research Aim

The main research aim of the study is to examine the modern recruitment strategies in global context.

Research objectives

The research objectives were set as;

- To understand the Existing Recruitment sources and Explore modern recruitment sources in any organization
- To identify the different methods and/ or sources of recruitment

Main research question

- What are the modern recruitment strategies used by the organizations?

The context

The research will be conducted to examine the modern recruitment strategies used by the organizations. The problem statement has been revealed that the awareness of modern recruitment strategies is at a lower level. Recruitment is the most critical part which lead to success and growth of any organization. Therefore, having sound awareness on modern recruitment strategies will be more useful for each organization. Moreover, the study is based on the global context and will not be limited to any country or region. Further, the unit of analysis is research articles and no people will be used as the sample.

Methods of analysis

This study will be qualitative since it will be based on secondary data and analyze the data through qualitative methods such as PRISMA model and thematic analysis. Further, the current study will be deductive. Deductive approach is based on existing theories and findings therefore, no new concepts or theories will be generated. The researcher will select 15 journal articles from reputed research publication websites such as Research Gate and Emerald Insight via random sampling. Moreover, the researcher will select the latest research articles which have been published during 2010 to 2020 for enhancing the relevancy of the information (Langkos, 2014).

Significance

A large number of studies have been conducted around the field of recruitment and selection, but they did not focus on the modern strategies for recruitment in organizations. Hence, there is a knowledge gap on the modern strategies for recruitment in organizations. Present study will be committed to address the research gap and it has summarized the 15 research articles regarding modern recruitment strategies. Thus, a reader can gain sound knowledge through the findings of this research.

Limitations

There are several limitations in the current study. Since the study was conducted as qualitative, the results of the study cannot be proved using numerical patterns or relationships. This qualitative research uses PRISMA model, thematic analysis, and other qualitative analysis methods that do not have no global standard. In contrast, quantitative studies are conducted using IBM SPSS and Excel using global standards. Therefore, the results cannot be proved using a globally recognized method. Further, since the research articles have been selected randomly, some significant recruitment strategies may have been missed. Finally, the researcher has selected only 15 journal articles from a limited number of research publication websites (Almeida, Faria and Queirós, 2017).

In any kind of organization, recruitment process considered as more important part indeed that supports to find and attract right candidates for the jobs. Organizations should aware of modern strategies for recruitment to acquire more talented human resources and attain organizational goals and objectives. Thus, this study will examine the modern recruitment strategies. This study will be qualitative since it will be based on the secondary data and analyze the data using qualitative methods such as thematic analysis. Further, present study will be put into deductive approach.

Literature Review

1.1 Chapter Introduction

The literature review explains the theoretical background of the study. The review is based to explore some definitions, concepts and models. The chapter represents the definitions of recruitment, recruitment process, recruitment models and modern recruitment strategies.

1.2 What is Recruitment

Recruitment is the process of searching for prospective employees and stimulating and encouraging to apply for the job. Recruitment is attracting and encouraging candidates to apply for the post in the organization. It determines present and future requirements of the organization. The main purpose of the organization is creating a pool of candidate at the low cost. Specially, recruitment planning is created base on size of the business. When preparing the recruitment policy, management should attend on the cultural, legal and economic factors of the organization. They often concern about the cost of recruitment. Organization hire employee because of recruitment needs. The recruitment policy provides a framework for recruitment also it contains some kinds of aspects such as organizational objectives, identification of recruitment needs, preferred sources of treatment, criterion of selection and preferences and the cost of the recruitment (Louw, 2016; Lievens and Chapman, 2019). According to the recruitment needs, it divides into three types.

- **Planned:** this type arises from changes in organization and recruitment policy.
- **Unexpected:** four emergency situations impact on this. These are resignations, deaths, accidents and illness.
- **Anticipated:** it refers to those movements in personnel which an organization can predict by studying trends in the internal and external environments.

Recruitment is not a single act or event. It is a process that brings together the employer and the prospective employees as a linking activity. In recruitment process, management select one best suitable person from total candidate pool. The process has ability to match jobs to suitable candidates. This is a two-way process between recruiter and recruited. When conducting the recruitment process, the management consider the factors such as image of the company, nature of job offered, organizational policies and working conditions. Recruitment process consists with six steps such as definition and requisitions, sources, communication of information, identifying prospective employees, encouraging and attracting applicants and candidate assessment. Requisitions contains the details about the positions to be filled and number of persons to be recruited. Management shout develop and locate both internal and external sources. They also

communicate the information of the organization to acquire prospective employees. Organization can implement special strategies to encourage the identified candidates for applying for the job. Management has a responsibility to analyze and evaluate the effectiveness of recruitment process by candidate progression. There are four elements of recruitment process: recruitment policy, recruitment organization, developing sources of recruitment and methods of recruiting. Recruitment policy specifies the objectives of recruitment and provides a framework for the implementation of the recruitment program. Recruitment policy involves enriching the organizational human resources by filling vacancies with the best qualified people and attitudes towards recruiting handicaps, minority groups, women, friends and relatives of present employees. When organization implements a recruitment policy, they find and employ the best qualified persons for each job. Management happen to implement strategies for retaining the hired employees. Organization has responsibility to provide facilities and opportunities for personal growth on the job. Factors affecting recruitment policy include organizational objectives, personnel policies of the organization and its competitors, government policies on reservations, preferred sources of recruitment, organizational recruitment needs, recruitment costs, financial implications and selection criteria and preferences. Pre – requisites of a good recruitment policy abide by the relevant public policy and legislation on hiring and employment relationship. Also, management provides employees with job security and continuous employment. If organization implement good recruitment policy, management should integrate organizational needs and employee needs. Organization should provide each employee with freedom and opportunities to utilize and develop knowledge and skills to the maximum possible extent. There are two types of recruitment: Centralized recruitment and Decentralized recruitment. Centralized recruitment performs all the functions or recruitment under personal department at the head office (Azmy and Abeng, 2019).

Methods of Recruitment

Recruitment methods are direct methods, indirect method and third-party methods. Under direct method scouting, manned exhibits and waiting lists are used. Indirect methods include advertisements in newspapers and journals, radio, television used to publicize vacancies. It helps to enable the candidates to assess their suitability. Various agencies, public employment exchanges and private consulting firms are used to recruit personnel (Matthews et al., 2012).

Recruitment Process

Recruitment process involves a systematic procedure from searching the candidates to arranging and conducting the interviews and requires many resources and time. The recruiting process includes following activities (Kamran et al., 2015; Tripathi, 2016).

- Identifying vacancies: It begins with the human resources department receiving requisitions for recruitment from different departments in the organization. It includes posts to be filled, number of vacancies, duties to be performed and qualifications with experience.
- Preparing job and person specification: After the identifying the job vacancies, organization should prepare the job positions. Employers provide the special training for job specification. Main characteristics of the identified jobs include the training, background of the job, main responsibilities and job boundaries, experience of job

holder and resources and constraints affecting the job. Management decides the types of candidates and their characteristics in this stage.

- Advertising vacancies: Organizations can advertise vacancies either through internal sources or external sources. By advertising, organization can locate the candidates. Specially, management should select the cost-effective advertising way.
- Managing response: Organization can receive the application to inspect using the recruitment policies. Management should identify most suitable candidates from applicant pool.
- Short listing and identifying the prospective candidates: management should short list most suitable candidates within all applicants. Management should prepare the list of qualified candidates.
- Arranging the interview with the shortlisted employees: After the short listing the list, interview dates are finalized. Interview board prepares the key performance indicators to filter the employees.
- Conducting the interview and decision making: As the final step, selection committee conducts the interview progress to select the qualified one.
- There are two sources of recruitment. These are recruitment from internal sources and recruitment from external sources. Internal sources are done within the organization. According to employees' performance, management get decision about their career development and organizational development.
- Transfers: Management shift identified employees from one department to another department according to their performance levels.
- Promotion: Results of the high-performance level, employees can promote from their current status.
- External recruitment sources are included.
- Advertisement: One of the most effective way for search employees from labor market is advertisement. Management publish attractive advisement in television, newspaper, web sites, radio and social media (Face Book, Instagram).
- Employment Agencies: These agencies seek employees as match with the vacant job.
- Deputation: These employees are selected from competitors. The employees entitle into highest good will within performance capacity.
- On the campus recruitment: According to some kinds of referrals, organization selects new candidates through universities, institutions and colleges.
- Telecasting: management can advertise the vacancy during the most popular TV program.

(Rozario, Venkatraman and Abbas, 2019)

1.3 Modern Recruitment Strategies

The recruitment strategy connects all important recruitment components and HR components, as the organization realizes its strategic goals. The recruitment strategy defines the unique mix of position of the organization on the job market, recruitment channels to be used for attracting candidates, recruitment style of the organization, differentiators from competitors on the job market, recruitment processes and procedures and recruitment metrics. The business strategy is a key document, which drives everything in the organization. HR strategy governs the HR management approach in the organization. HR strategy defines key initiatives for HR employees and sets priorities and goals. The recruitment strategy has to analyze the current organization and all gaps in the staffing area. The recruitment strategy has to define the right mix of

different recruitment tools, as the organization succeeds in the job market competition. Specially, management try to get competitive advantages in the recruitment area. The recruitment strategy defines the basic recruitment processes and procedures. With the technological development and globalization, management can streamline the recruiting process. Organizations use spreadsheets, email and post and pray job ads as new trending technologies. The modern recruitment tool mainly uses not only hiring people into organization but also selection of talent. Currently, organizations concern online recruitment tools or recruitment software to demonstrate the innovational inside within the organization. Results of this kinds of innovative recruitment methods, management can highlight every steps of the recruitment process. Referral policy, referral systems, social media recruiting tools and onboarding are other additional tools of the effective recruitment process. With changing the world, organization can base modern recruitment techniques and tools over 24 hours to raise hiring game of recruiters and managers (Sołek-Borowska and Wilczewska, 2018).

Reddit is a community messaging site with a user base running to hundreds of millions. If individuals are active in the community, they can absorb benefits within job ad more easily. Reddit generates informal tone and individuals have ability to reply comments. They can build a strong relationship with a candidate pool. Github is a popular platform among developers for working individually or collectively on projects. Management can add value for business within the effective usage of Github. Facebook Graph Search is the other tool that post job on Facebook. It is a popular practice of the world.

Automation and Artificial Intelligence is least technology to development of the organizations. In the modern organizational culture, management focus to automate every operational activity for survival against their competitors. As a result of technology development, management bases the automation and Artificial Intelligence to recruit employees. Artificial Intelligence for recruitment is the next generation of software intended to improve or automate parts of the talent acquisition. AI is the application of artificial intelligence. As the process, computer aid to solve problems related to the recruitment functions. Management expect to streamline or automate some part of the recruiting process using this new technology. Specially, they target repetitive and high – volume task to automate. Machines are better at certain things. Management are interested to invest AI for recruiting for avoiding time consuming activities like manually screening resumes that is biggest challenge in talent acquisition. According to the view of interviewers, identifying the right candidates from a large applicant pool is the hardest part of recruitment. AI can be leveraged to support humans by automating sourcing, screening, matching and assessing. Research featured in the Harvard Business Review found that compared to using expert human judgment, an algorithm increases the accuracy of selecting successful job candidates by more than 50% (Upadhyay and Khandelwal, 2018). According to the AI trending,

Trend 01 – AI in Sourcing

Management try to get better applicants with less cost, low effect and time efficiency using AI in sourcing. AI surpasses Boolean search as it is able to find matches that do not contain specific keywords. AI in sourcing helps to eliminate human bias that include age, race and gender of candidate by assessing candidates purely on their merits. AI can learn already existing human bias, so it is important to take steps to remove clear

patterns of potential bias. AI for candidate sourcing is technology that searches for data that people leave online to find passive candidates that match organizational job requirements.

Trend 02 – AI in Screening

AI in screening saves time of recruiters by automating high – volume tasks. There are hundreds of millions of candidate profiles and CVs online. Manual screening of resumes is still the most time – consuming part of recruiting. As the results, 75% to 88% of the resumes received for a role are unqualified. Screening resumes and shortlisting candidates to interview is estimated to take 23 hours of a time of recruiter for a single hire. The trend utilizes AI – powered chatbots. Organization can automate manual and labor – intensive initial candidate screening by reviewing candidate application with individuals, answering questions about the hiring process and if the candidate is interested and qualified, management can schedule first interview.

Trend 03 – AI in Candidate Matching

AI in Candidate Matching is implemented by algorithms that analyze multiple sources of data that include personality traits of candidates, skills and salary preferences to automatically assess candidates against the job requirements.

Trend 04 – AI in Assessing

AI in Assessing link to each unique performance measures of job. These kinds of AI – driven assessments use custom algorithms to connect the dots between assessment information and job success. AI and machine learning can be used to assess video interviews based on what the candidates say during their interview and how they say it analyzing. Specially, management considers content and phrasing, language level, voice, tone, physical gestures, heat variations across their face and even their pupil dilation.

(Geetha and Reddy, 2018; İşgüzar and AYDEN, 2019; Vedapradha, Ravi and Rajan, 2019)

An algorithm can replace a recruiter when it comes to sourcing and assessing job candidates, but it cannot when it comes to engaging to individuals interviewing and relationship - building. AI for recruiting changes the recruiter role because low – value, time consuming recruiting tasks will become streamlined and automated with AI. Also, role of recruiter will become more strategic. Tech savvy recruiters will benefit from AI, Tech savvy recruiters will learn about and embrace technology which will lower costs, improve time to time, quality of applicants and ultimately, quality of hire. Futureproof recruitment success strategies include leverage AI in sourcing and early screening stages, using programmatic for better job advertising, understanding and deploying AI tools for improving candidate experience and becoming abs early adopting or fast – follower, do not wait for the tools to became mainstream. Organization happen to face some kinds of challenges of AI in recruiting such as requiring a lot of data, can learn human biases and skepticism of new technology (Vasanthasekaran and Rajkumar, 2019).

Some organization use Enterprise Resource Planning (ERP) system HRIS to automate the

human resource functions. ERP system is a software package that composes of several modules to provide cross organizational integration of data in the business process. Modules are human resources, sales, finance, marketing, supply chain and production. ERP is the combination of inventory management, purchasing, vendor integration, CRM, payroll, accounting, internet/ SMS/ LAN/ WAN, customers and sales. Human resource module of ERP base on central database with human resource planning, recruitment management, training management, time management, performance management and compensation management. HRIS is the information system that use in human resource management. It is only integrated HRM functions of the organization. The system helps to develop human capital of the organization. Job seekers can touch about these systems of interested organization. Management publish their vacancies in this system, and they can apply through registration. Operators of system create personal accounts for each employee in the organization from initial step of recruitment to leave within the organization. Employees can automatically know about their salary deduction, salary levels, leave counts, training opportunities and promotions. Also, management update recruitment needs when space in vacancies because of promotion, retirement, sick or leave. Specially, the systems are very important for internal employees of the organizations (Benders et al., 2009; Nagendra and Deshpande, 2014).

Research Methodology

The methodological chapter of the research represents the research process descriptively necessary to complete the research. It provides information considering the method that was employed in conducting this research as well as justify the use of research methods. This chapter typically includes philosophical background, research approach, research design, data collection. Finally, the chapter ends with a discussion on the tools used to analyze collected data.

Research Philosophy

Research philosophy represents the beliefs and assumptions on the phenomenon of collecting, analyzing and using the research data. Such assumptions provide guidance to complete the research. There are five major philosophies; Positivism, Interpretivism, Critical realism, Postmodernism and Pragmatism (Saunders, Lewis and Thornhill, 2009). Research philosophies vary with the goals of the research. Therefore, current research follows positivism since it works with observable social reality.

Research Approach

Basically can be identified two kinds of research approaches: Deductive and Inductive. Deductive approach is a top-down approach that develop hypotheses and entails a process of testing hypotheses in order to verify an existing theory. Inductive approach, researcher leads efforts to investigate a specific objective that examine an existing theory based on past literature. Primarily inductive approach commits to develop a theory on the other hand deductive approach attempts to testing and prove an existing theory (Burney and Saleem, 2008). Abductive approach is emerged to avoid the weaknesses in both deductive and inductive approaches. Current study is deductive. Deductive research is based on existing findings and theories and no new concepts or theories will be generated. Deductive research goes from theory to data. Therefore, current study will put into the deductive category (Grover, 2015).

Research Method

Research design gives an appropriate framework for a research work. Research method can be classified into three major categories: Quantitative, Qualitative, and Mixed method. Quantitative research looks at patterns of numerical data. Qualitative research commits to present deep investigation through exploring and understanding the variables (Sharma, 2018). Mixed method is a combination of both qualitative and quantitative method since just one method would be unable to attain research objectives. Current study is based on qualitative method indeed, the methods are subjective and uses quite different methods to collect data. Also, this research has been used systematic review that the analysis based on the table of past literature.

Research Strategy

Research strategy is a general plan that allows the researcher to investigate the research questions in a systematic way (Saunders, Lewis and Thornhill, 2009). Some important research strategies used in a research are case studies, interview, observation, experiments, survey, etc. Case study is used to provide an in-depth description of events, relationships, experiences or processes exist in particular instance; observation is a method used by the researchers observe the specific research field; Survey is a comprehensive data gathering strategy about the characteristics, actions or opinions of a big group; Interview is a qualitative research strategy that use open-ended questions in the conversations in order to collect data extensively and intensively. It may be structured or unstructured one (Jamshed, 2014).

Current study is used survey since it has a prescribed sample (15) and evaluate all the samples equally. In order to researcher collects qualitative data and information related to the modern recruitment strategies.

Data Source

Data can be gathered in two major sources in terms of primary and secondary data sources. The data which gathered by researcher first-hand is referred as primary data. Thus, primary data are the fresh or original source of information (Sharma, 2018). While secondary data means the data which have been collected by someone other than the user. Hence, secondary data is already available. Primary data collection uses surveys, experiments, or direct observations. Then, secondary data have diverse sources off documents or electronically stored information, census and market information. Current study based on secondary data indeed, the researcher has selected 15 journal articles in relates with current problem area.

Data collection

Data can be collected using different techniques. The method/ technique of data collection is depended on the research question. In current research, data was collected as a table (also known as literature matrix) using the PRISMA model. The headings of the literature matrix have been presented below.

1. Author
2. Year
3. Journal
4. Topic
5. Findings

Research Population and Sample

The primary purpose of sampling is selecting appropriate population and elements towards the study can be appropriately researched. Population is a complete set of elements defined by the sampling criteria established by the researcher. That compose of two groups as target population and accessible population. Sample means that representative of the total population (Parveen and Showkat, 2017). The population of the current study is all the previously published journal articles which related to the area of recruitment strategies. Out of them the researcher selected 15 journal articles as the sample of present study by using PRISMA model and the selected journal articles after peer reviewed.

Data analysis

Data analysis is a process whereby a phenomenon answers the research questions raised in the problem statement. This study is a qualitative research. There are many different techniques to analyze the qualitative data; some important analysis methods are summarizing, narrative analysis, thematic analysis, meta-analysis, etc. (Kawulich, 2004). Analyzing qualitative data generally looks at the patterns and themes and searching different relationships among gathered data that allows the researcher to understand what they have and then represent the information. Current study used thematic analysis analyze the data of this research study. Thematic analysis is a flexible analysis technique to identify, analyze and report the patterns and themes in the qualitative data (Braun, Clarke and Terry, 2014).

Ethical Considerations

Protection of human subjects via use of suitable ethical principles is critical for any research work. Since the researcher use the secondary data, ethical issues will not be affected much. However, the research will not evaluate any of the research articles using personal opinions and every secondary data source will be cited using Harvard Reference Format 1 (Binti Mohd Arifin, 2018).

Discussion on new recruitment methods identified

In the data analysis, the following new recruitment strategies have been identified as modern recruitment strategies.

Use of technology - The use of technology for the existing recruitment process can enhance the effectiveness of the recruitment process. Today, several job recruitment websites allow organizations to post jobs and select employees. Moreover, some web portals provide all in one solution for organizations (Orlitzky, 2019).

E-recruitment - E-recruitment is a trending concept in the world and with the pandemic situation, video recruitment has become a trending recruitment method. In this context, Skype, Zoom, and Google meetings can be used to conduct the interviews (Solek-Borowska and Wilczewska, 2018).

Application of equality - Modern business development concepts should be adopted in recruitment to obtain greater performance. Today, organizations are focus on giving equal opportunities to all and treating all employees equally (Azmy and Abeng, 2019).
Online based recruitment system - Online based recruitment system can be used to

utilize modern technology to recruitment activities. An organization can use the video uploading method to attract the employees in a wide variety of attributes. Moreover, considering the video uploading method, organizations used it as a pre-interview method (Sivabalan, Yazdanifard and Ismail, 2015).

Social media recruitment (Facebook) - Social media recruitment is used by the organization as a low-cost tool for recruitment. On Facebook, there is a special facility for organizations to post jobs. Moreover, users of Facebook can apply for jobs using their profiles. Using social media is an effective and low-cost tool available for small scale organizations (Sambamoorthy, 2019).

Psychological assessments - psychological assessments are used to recruit the employees in the modern context. psychological assessments can measure the attitudes of the employee and in the modern context, attitudes and emotional intelligence considers as predictors of employee performance (Louw, 2016).

E-HR mechanisms - e-HR or thee Human Resources Management is a new trend in HR fields which enables organizations to digitalize their business operations. Under e-HR, "E-HR mechanisms" are used to introduce the new technology for HR functions. E-recruitment is a sub-element of "E-HR mechanisms" (Baykal, 2020).

Recruitment through Corporate websites - Corporate websites can be used to attract just graduated and young employees. When posting career vacancies on the corporate website, there is a higher possibility of attracting high quality and most suitable employees (Baykal, 2020).

AI-based recruitment system - IT firms use an AI-based recruitment system for selecting employees. Under AI-based recruitment, the software has been designed to review and filter the CVs of applicants automatically. That software can review more than 150000 resumes at once and select a small number of best employees based on the prescribed criteria of the organization (Sudhakar, 2018).

Applicant Tracking Software (ATS) - Applicant Tracking Software (ATS) is used to manage the entire recruitment and selection process of the organization. Applicant Tracking Software (ATS) can manage the recruitment campaigns, accepting and reviewing applications, send emails to applicants, calling for interviews, etc. (Salahudeen, Palanisingham and Gurumoorthy, 2019).

Professional networks (LinkedIn) - Professional networks are another trending method of recruitment. Professional networks such as LinkedIn can be used to manage the recruitment and selection of employees. LinkedIn allows employees to enter their information can create job resumes automatically. Moreover, an organization can post jobs on LinkedIn and select the best employees (Rehman and Mazhar, 2016).

Discussion on objectives

The main research aim of the study is to examine the modern recruitment strategies in global context. Use of technology, E-recruitment, Application of equality, Online based recruitment system, Social media recruitment (Facebook), Psychological assessments,

E-HR mechanisms etc. were identified as modern recruitment strategies and the full list of modern recruitment strategies has been provided in the previous section.

Moreover, other objectives were achieved as follows.

Main objective was to understand the importance of recruitment in any organization. In the literature review, it has been identified as recruitment strategies help to implement managerial functions in an active mood. The quality of the recruitment strategies and techniques influence to select the right person, for the right position at the right time. Next, objective is to identify the different methods and/ or sources of recruitment. Newspaper, internet, social media, professional networks, and corporate websites have been identified as sources of recruitment. Finally, objective is to examine the factors cause to the recruitment. The main factors cause to recruitment are labor market conditions, objectives of the organization, market competition, employee expectations etc.

Overall conclusion

In the data analysis; Use of technology, E-recruitment, Application of equality, Online based recruitment system, Social media recruitment (Facebook), Psychological assessments, E-HR mechanisms, Recruitment through Corporate websites, AI-based recruitment system, Applicant Tracking Software (ATS) and Professional networks (LinkedIn) has been identified as modern recruitment strategies.

Recommendations

In the data analysis, several data analysis methods have been identified and it is recommended to implement those strategies with the consideration of cost, priority, and responsibility. Moreover, recruitment strategies should be updated with the time and according to the changes in the external environment. The external environment analysis should be conducted to determine the latest trends of human resources management. Moreover, benchmarking should be conducted to compare the recruitment strategies of the organization with the other organizations and adjust the current strategies of the organization to the maximum level.

Data Source is attached for your reference.

	Author and year	Journal	Topic	Findings
1	(Orlitzky, 2019)	Conference paper	Recruitment strategy	The use of technology for the existing recruitment process can enhance the effectiveness of the recruitment process. Today, several job recruitment websites allow organizations to post jobs and select employees. Moreover, some web portals provide all in one solution for organizations.
2	(Sołek-Borowska and Wilczewska, 2018)	Economics and Culture	New Technologies in the Recruitment Process	E-recruitment is a trending concept in the world and with the pandemic situation, video recruitment has become a trending recruitment method. In this context, Skype, Zoom, and Google meetings can be used to conduct the interviews.
3	(Azmy and Abeng, 2019)	Conference paper	Recruitment Strategy To Hire The Best People For Organization	Modern business development concepts should be adopted in recruitment to obtain greater performance. Today, organizations are focus on giving equal opportunities to all and treating all employees equally.
4	(Sivabalan, Yazdanifard and Ismail, 2015)	International Business Research	How to Transform the Traditional Way of Recruitment into Online System	Online based recruitment system can be used to utilize modern technology to recruitment activities. An organization can use the video uploading method to attract the employees in a wide variety of attributes. Moreover, considering the video uploading method, organizations used it as a pre-interview method.

5	(Sambamoorthy, 2019)	Conference paper	A Study on Recent Trends in Recruitment Practices in India	Social media recruitment is used by the organization as a low-cost tool for recruitment. On Facebook, there is a special facility for organizations to post jobs. Moreover, users of Facebook can apply for jobs using their profiles. Using social media is an effective and low-cost tool available for small scale organizations.
6	(Louw, 2016)	SA Journal of Human Resource Management	Exploring recruitment and selection trends in the Eastern Cape	Psychological assessments are used to recruit the employees in the modern context. Psychological assessments can measure the attitudes of the employee and in the modern context, attitudes and emotional intelligence considers as predictors of employee performance.
7	(Baykal, 2020)	Conference paper	Digital Era and New Methods for Employee Recruitment	E-HR or you Human Resources Management is a new trend in HR fields which enables organizations to digitalize their business operations. Under e-HR, "E-HR mechanisms" are used to introduce the new technology for HR functions. E-recruitment is a sub-element of "E-HR mechanisms". HuHuhhhaaa Corporate websites can be used to attract just graduated and young employees. When posting career vacancies on the corporate website, there is a higher possibility of attracting high quality and most suitable employees.

8	(Sudhakar, 2018)	Indian IT Industry and HR Perspectives	Recruitment Strategies of Indian IT firms	IT firms use an AI-based recruitment system for selecting employees. Under AI-based recruitment, the software has been designed to review and filter the CVs of applicants automatically. That software can review more than 150000 resumes at once and select a small number of best employees based on the prescribed criteria of the organization.
9	(Salahudeen, Palanisingh and Gurumoorthy, 2019)	Conference paper	Emerging trends in recruitment and selection	Applicant Tracking Software (ATS) is used to manage the entire recruitment and selection process of the organization. Applicant Tracking Software (ATS) can manage the recruitment campaigns, accepting and reviewing applications, send emails to applicants, calling for interviews, etc.
10	(Rehman and Mazhar, 2016)	International Journal of Research	A Study On New Hiring Strategies To Manage Talent Crisis At Entry Level From The Perspective Of Recruiters And Fresh Graduate Engineer Job Seekers	Professional networks are another trending method of recruitment. Professional networks such as LinkedIn can be used to manage the recruitment and selection of employees. LinkedIn allows employees to enter their information can create job resumes automatically. Moreover, an organization can post jobs on LinkedIn and select the best employees.

11	(Chungyalpa, 2016)	Conference paper	Best Practices and Emerging Trends in Recruitment and Selection	Best practices of recruitment and selection includes technological development of the existing recruitment system and blind hiring. In the blind hiring, personal characteristics of the employee will not be considered.
12	(Braun and Veresné Valentinyi, 2019)	Trendy v podnikání	HR Trends at the beginning of the 21st century	In the blind hiring, identification details will be removed from the CVs of the candidates. Then, name, race, language, religion etc. will be removed and only the qualifications and experiences will be considered. By using this method, most suitable people can be selected for the job.
13	(Villegas <i>et al.</i> , 2019)	Conference paper	Human Resources as Ethical Gatekeepers: Hiring Ethics and Employee Selection	As a hiring ethic, it is important to offer the equal opportunities for all genders, age categories and all ethnic groups. Ethics in HRM has been identified as a new trend in the research paper.
14	(Unadkat, 2012)	Conference paper	Need of E-Recruitment strategies in emerging scenario	Recruitment strategies should be updated with the time and according to the changes in the external environment. The external environment analysis should be conducted to determine the latest trends of human resources management. Moreover, benchmarking should be conducted to compare the recruitment strategies of the organization with the other organizations and adjust the current strategies of the organization to the maximum level.

15	(Nazari, 2014)	Mediterranean Journal of Social Sciences	Talent Management and Recruitment Strategies	Need of updating the recruitment strategies according to the environmental trends have been mentioned in this paper. The areas where an organization needs to pay their attention includes technological changes, attitudes changes in the society, political changes, social changes, and legal changes. For example, when a law of recruitment is introduced, all organizations must follow it.
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References

Almeida, F., Faria, D. and Queirós, A. (2017) 'Strengths and Limitations of Qualitative and Quantitative Research Methods', *European Journal of Education Studies*, 3, pp. 369–387. doi: 10.5281/zenodo.887089.

Azmy, A. and Abeng, T. (2019) 'RECRUITMENT STRATEGY TO HIRE THE BEST PEOPLE FOR ORGANIZATION'.

Baykal, E. (2020) 'Digital Era and New Methods for Employee Recruitment', in, pp. 412–430. doi: 10.4018/978-1-7998-1125-1.ch018.

Benders, J. et al. (2009) 'ERP-systems and job content: A case study of HR-assistants', *Personnel Review*, 38. doi: 10.1108/00483480910992256.

Binti Mohd Arifin, S. R. (2018) 'Ethical Considerations in Qualitative Study'.

Braun, E. and Veresné Valentinyi, K. (2019) 'HR Trends at the beginning of the 21st century', *Trendy v podnikání*, 9, pp. 54–61. doi: 10.24132/jtb.2019.9.3.54_61.

Burney, S. M. A. and Saleem, H. (2008) 'Inductive and Deductive Research Approach'. doi: 10.13140/RG.2.2.31603.58406.

Chungyalpa, W. (2016) 'Best Practices and Emerging Trends in Recruitment and Selection', *Journal of Entrepreneurship & Organization Management*, 05. doi: 10.4172/2169-026X.1000173.

Geetha, R. and Reddy, D. (2018) 'Recruitment through artificial intelligence: A conceptual study', *International Journal of Mechanical Engineering and Technology*, 9, pp. 63–70.

Grover, V. (2015) 'RESEARCH APPROACH: AN OVERVIEW', *Golden Reserach Thoughts*, 4, pp. 1–8.

Harky, Y. (2018) 'The Significance of Recruitment and Selection on Organizational Performance: The Case of Private owned Organizations in Erbil, North of Iraq', *International Journal of Contemporary Research and Review*, 9. doi: 10.15520/ijcrr/2018/9/02/422.

İşgüzar, S. and AYDEN, C. (2019) 'New Decision Mechanism in the Recruitment Process: Artificial Intelligence', in, pp. 196–205.

Jamshed, S. (2014) 'Qualitative research method-interviewing and observation', *Journal of basic and clinical pharmacy*, 5, pp. 87–88. doi: 10.4103/0976-0105.141942.

Kamran, Asif et al. (2015) 'Analysis of the Recruitment and Selection Process', *Proceedings of the Ninth International Conference on Management Science and Engineering Management*, 362, pp. 1357–1375. doi: 10.1007/978-3-662-47241-5_114.

Kapur, R. (2018) 'Recruitment and Selection'.

Kawulich, B. (2004) 'Qualitative Data Analysis Techniques', in.

Langkos, S. (2014) 'CHAPTER 3 - RESEARCH METHODOLOGY: Data collection method and Research tools', in. doi: 10.13140/2.1.3023.1369.

Lievens, F. and Chapman, D. (2019) 'Recruitment and Selection', in.

Louw, G. (2016) 'Exploring recruitment and selection trends in the Eastern Cape', *SA Journal of Human Resource Management*, 11. doi: 10.4102/sajhrm.v11i1.319.

Matthews, A. et al. (2012) "Don't wait for them to come to you, you go to them". A qualitative study of recruitment approaches in community based walking programmes in the UK', *BMC public health*, 12, p. 635. doi: 10.1186/1471-2458-12-635.

Nagendra, A. and Deshpande, M. (2014) 'Human Resource Information Systems (HRIS) in HR Planning and Development in Mid to Large Sized Organizations', *Procedia - Social and Behavioral Sciences*, 133, pp. 61–67. doi: 10.1016/j.sbspro.2014.04.169.

Nazari, K. (2014) 'Talent Management and Recruitment Strategies', *Mediterranean Journal of Social Sciences*. doi: 10.5901/mjss.2014.v5n20p3085.

Orlitzky, M. (2019) 'Recruitment Strategy', *The Oxford Handbook of Human Resource Management*. doi: 10.1093/oxfordhb/9780199547029.003.0014.

Parveen, H. and Showkat, N. (2017) 'Data Collection', in.

Rehman, S. and Mazhar, D. S. (2016) 'A Study On New Hiring Strategies To Manage Talent Crisis At Entry Level From The Perspective Of Recruiters And Fresh Graduate Engineer Job Seekers', *International Journal of Research - GRANTHAALAYAH*, 4, pp. 14–29. doi: 10.5281/zenodo.157507.

Rozario, S., Venkatraman, S. and Abbas, A. (2019) 'Challenges in Recruitment and Selection Process: An Empirical Study', *Challenges*, 10, p. 35. doi: 10.3390/challe10020035.

Salahudeen, V., Palanisingh, V. and Gurumoorthy, T. (2019) 'EMERGING TRENDS IN RECRUITMENT AND SELECTION', 6, pp. 3168–3171.

Sambamoorthy, M. (2019) 'A Study on Recent Trends in Recruitment Practices in India', *International Journal of Trend in Scientific Research and Development*, Volume-3, pp. 749–751. doi: 10.31142/ijtsrd23902.

Saunders, M., Lewis, P. and Thornhill, A. (2009) 'Understanding research philosophies and approaches', *Research Methods for Business Students*, 4, pp. 106–135.

Sharma, S. (2018) 'Introduction to Research Methods'.

Sivabalan, L., Yazdanifard, A. P. D. R. and Ismail, N. H. (2015) 'How to Transform the Traditional Way of Recruitment into Online System', *International Business Research*, Canadian Center of Science and Education, 7, pp. 178–185. doi: 10.5539/ibr.v7n3p178.

Sivabalan, L., Yazdanifard, A. P. D. R. and Ismail, N. H. (2015) 'How to Transform the Traditional Way of Recruitment into Online System', *International Business Research*, Canadian Center of Science and Education, 7, pp. 178–185. doi: 10.5539/ibr.v7n3p178.

Sołek-Borowska, C. and Wilczewska, M. (2018) 'New Technologies in the Recruitment Process', *Economics and Culture*, 15, pp. 25–33. doi: 10.2478/jec-2018-0017.

Sudhakar, G. (2018) 'Recruitment Strategies of Indian IT firms', in, pp. 85–92.

Tripathi, R. (2016) 'An empirical study on recruitment and selection process with reference to Private Universities in Uttarakhand', in.

Unadkat, P. (2012) 'Need of E-Recruitment strategies in emerging scenario NEED OF E-RECRUITMENT STRATEGIES IN EMERGING SCENARIO', in.

Upadhyay, A. and Khandelwal, K. (2018) 'Applying artificial intelligence: implications for recruitment', *Strategic HR Review*. doi: 10.1108/SHR-07-2018-0051.

Vasanthasekaran, P. and Rajkumar, V. S. (2019) 'Artificial Intelligence in Campus Recruitment', in.

Vedapradha, R., Ravi, H. and Rajan, S. (2019) 'Artificial Intelligence: A Technological Prototype in Recruitment', *Journal of Service Science and Management*, 12, pp. 382–390. doi: 10.4236/jssm.2019.123026.

Villegas, S. et al. (2019) 'Human Resources as Ethical Gatekeepers: Hiring Ethics and Employee Selection'.

A study on involvement of children in video games

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Abstract

Video gaming has become a trending activity around the world without any age limit. The compulsive use of video games leads to video game addiction. The addiction may effects the digital well-being of the people. This research was conducted to give awareness for people regarding the impact of the video game addiction in children and to study the involvement of children in video games in current Sri Lanka. This was based on developing a webpage, with questionnaires and corresponding warnings, which can provide awareness for people regarding the impacts of video game addiction, how to overcome such situations to reduce the video game addiction and build a digital wellbeing among the children. In order to do the study, questions and corresponding warnings were derived from secondary sources. Those questions were shared as a survey to find the "impacts of video games in children" in the current society and the correlation between each of them were found. Most of the variables had strong positive correlation, where both variables increases at same time. Furthermore, questions and corresponding warnings were given in a webpage along with the statistical analysis of the sample data. This webpage would be useful for elders to understand the video gaming addictions and through the questionnaires, they can judge their child and the symptoms video gaming addictions. Further, this research discusses about the correlation between each questions which are given in the webpage. The warning given for each answers will help them to build a digital well-being within their family.

Author Keywords

Digital wellbeing, children, video games, video game addiction, impact of video gaming addiction

Introduction

Video gaming has become a trending activity around the world. People are engaged in playing video game without any age limits. The compulsive use of video games leads to video game addiction. The addiction may cause problems in the personal life of them in a way, where the digital wellbeing can be effected. The targeted group of this research is children.

Often considered a form of computer addiction, video game addiction has been an increasing concern for parents as video games have become more common place and are often targeted at children. Video games include computer games, console games, arcade machine games, and even cell phone, and advanced calculator games. Games can be embedded in social networking site, such as Facebook. (Hartney, 2020)

There are plenty of researches which have been conducted under video game addiction. The most of the researches discuss the advantages of playing video games, negative consequences of excessive video game use, problematic gaming and etc. Therefore, as a reader a person can understand the impact of being addicted to video games by

reading the previous researches, but still there's no any specific digital way to find it with the evidence.

Therefore, through my research, I'm hoping to develop a webpage which can be used to give awareness for people regarding the video game addiction. This webpage will be helpful for the users to reduce the video gaming addiction and build a digital wellbeing among them.

Methodology

Analyzing the data collected using the google form

The correlation between variables was viewed using the orange software to visualize the relations between each of them.

Implementation of webpage to aware the people about the video gaming addiction

The proper data were extracted from the collected secondary data. Those data were used to derive questions for the questionnaires, which can helps to find whether a child is having the symptoms of video gaming addiction. Warnings related to each answers in questions were formed using the collected secondary data.

The webpage was developed including the derived questions and the relevant warnings for each questions. The webpage consists of an introduction regarding the video game addiction, the questionnaires and the discussion of the analysis the collected data.

The webpage was developed using the technologies such as HTML, CSS and JavaScript in atom software. HTML is the standard markup language which was used to build webpage. CSS is a style sheet language which was used to design and change the styles of the content in web page. JavaScript is an interpreted and scripting language which was embedded in HTML codes to enhance them. These technologies were used in this webpage, to make a good user interface and user experience.

Experiment

The correlation of each variables were gained using the orange software as follows. The following concept was used for the result and discussion.

- Positive correlation: +0.5 to +1 indicates very strong positive correlation. Which means that both variables increase at the same time.
- Negative correlation: -0.5 to -1 indicates very strong negative correlation. Which means that if one variable increases, the other variable decreases at same time.
- No correlation: value 0 indicates no correlation.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A	1																			
B	-0.02173	1																		
C	-0.00265	0.062046	1																	
D	0.159044	0.069835	0.614085	1																
E	0.000366	-0.02545	0.129910	0.119909	1															
F	0.097268	-0.06612	0.450724	0.446897	0.091677	1														
G	0.012146	0.133196	0.645574	0.510887	0.030386	0.438544	1													
H	0.163455	-0.02923	0.457397	0.451366	0.027681	0.452277	0.565538	1												
I	0.121809	-0.00766	0.59957	0.683278	0.073353	0.431233	0.535316	0.570372	1											
J	0.17575	0.007551	0.746307	0.782742	0.145658	0.576086	0.699905	0.583577	0.654288	1										
K	0.107368	0.021512	0.475967	0.519404	0.105478	0.409076	0.491133	0.538477	0.425544	0.613541	1									
L	0.083214	-0.02472	0.543617	0.651286	0.044584	0.621152	0.533581	0.489343	0.578803	0.693019	0.486752	1								
M	0.243576	0.134662	0.599027	0.694638	0.045617	0.400234	0.615724	0.544468	0.667929	0.723782	0.631749	0.537346	1							
N	-0.17697	-0.08382	0.490323	0.511836	0.021227	0.427773	0.433102	0.5540	0.434077	0.000440	0.482347	0.41251	0.445923	1						
O	0.077867	0.06908	0.730507	0.646808	0.152102	0.529765	0.676797	0.541151	0.744842	0.721894	0.524491	0.839599	0.652239	0.427221	1					
P	0.224334	-0.12528	0.557099	0.624679	0.070823	0.431286	0.474079	0.489328	0.700851	0.697684	0.359846	0.596047	0.660637	0.476734	0.68021	1				
Q	0.067968	0.047676	0.679699	0.739794	0.081915	0.507557	0.639377	0.381273	0.537977	0.787457	0.558277	0.965375	0.629489	0.521126	0.684453	0.511033	1			
R	0.057894	0.034556	0.510631	0.592827	0.083818	0.407112	0.595801	0.338351	0.405856	0.660828	0.40504	0.456501	0.450839	0.413385	0.584619	0.454093	0.688153	1		
S	0.260345	-0.06119	0.517512	0.650592	0.074231	0.41451	0.443616	0.472022	0.661741	0.683351	0.458587	0.825047	0.654395	0.459337	0.657581	0.734108	0.629927	0.53616	1	
T	0.061466	-0.02618	0.649403	0.696185	0.111679	0.536515	0.717544	0.606515	0.645579	0.795524	0.599006	0.65396	0.681185	0.480332	0.812189	0.579006	0.792805	0.691843	0.850285	1

The alphabets indicate,

- A. Gender
- B. Age
- C. Sacrifices basic needs to play games(e.g. Eating, sleeping)
- D. Talking about their games incessantly
- E. Illness which causes due to excess gaming habit. (except the genetic disorders)
- F. Engagement of the child in events
- G. Confusing fantasy and reality
- H. Getting complains from the school
- I. Behaving emotionally when the game is over
- J. Acting violently
- K. Getting angry
- L. Having gaming as the life focus
- M. Neglecting the schools works to play video games
- N. Trying to escape from life problems instead of solving them
- O. Feeling annoyed when unable to play
- P. Feeling guilty for spending time on doing some productive
- Q. Being defensive when told about their excessive gaming
- R. Child lying to the family regarding the amount of time spend on playing game
- S. Being preoccupied with games is having a high
- T. Always thinking about the games

Discussion:

- The correlation of gender compared to all other variables are very weak as the responses were not equally divided among the gender category. Therefore, those correlation can be neglected.
- The correlation of age compared to all other variables are very weak as the responses were not equally divided among the age group. Therefore, those correlation can be neglected.
- The correlation of illness compared to all other variables are very weak. Therefore, those correlation can be neglected.
- Other than the above correlations, the strong positive correlations found between each variables have been represented in the above chart. The highlighted values show the strong positive correlation. Hence the association between such variables can be discussed as follows:
 - The correlation of variables compared to get angry:

Variable	Correlation	Range of correlation	Discussion
<u>neglect school Work</u>	+ 0.632	Strong Positive correlation	This correlation shows that neglecting the schools works is having a high correlation with getting angry.
<u>talk incessantly</u>	+0.519	Strong Positive correlation	This correlation shows that talking about their games incessantly is having a high correlation with getting angry.
<u>annoyed unable to play</u>	+0.524	Strong positive correlation	This correlation shows that feeling annoyed when unable to play is having a high correlation with getting angry.
<u>defensive excessive Gaming</u>	+0.558	Strong Positive correlation	This correlation shows that being defensive when told about their excessive gaming is having a correlation with getting angry.
<u>school complaints</u>	+0.538	Strong positive correlation	This correlation shows that getting complains from the school is having a high correlation with getting angry.
<u>think about Games</u>	+0.559	Strong positive correlation	This correlation shows that always thinking about the games is having a correlation with getting angry.
<u>life focus gaming</u>	+0.507	Strong Positive correlation	This correlation shows that having gaming as the life focus is having a correlation with getting angry.
<u>act violence</u>	+0.614	Strong Positive correlation	This correlation shows that acting violently is having a correlation with getting angry.

Conclusion

A study on involvement of children in video games is given for the society through this research. In order to give the awareness of “impacts of video game addiction” to the society to maintain digital wellbeing in playing video games. And a webpage was built based on video gaming addiction using the findings done by the secondary survey. This webpage is based on providing an introduction for the users regarding video games and the impact of it. This will obviously help to build a digital wellbeing among the society.

References

- Collett., N. S. a. K., 2020. Video games and wellbeing. [Online]
Available at: https://shiftdesign.org/content/uploads/2014/09/Shift_videogamesandwellbeing_final.pdf
- Dodds, C. H. a. L., 2018. Addictive video games may change children's brains in the same way as drugs and alcohol, study reveals. THE TELEGRAPH, 13 June.
- Hartney, E., 2020. The Signs and Effects of Video Game Addiction. [Online]
Available at: <https://www.verywellmind.com/what-is-video-game-addiction-22333>
- Markus Dworak, T. S. ., T. B. a. H. K. S., 2007. Impact of Singular Excessive Computer Game and Television Exposure on Sleep Patterns and Memory Performance of School-aged Children. Pediatrics, 120(5).
- Michael Gradisar, A. D. N. L. J. W. G. M. P. D., 2013. The impact of prolonged violent video-gaming on adolescent sleep: an experimental study -. Journal of sleep research, 22(2), pp. 137-143.
- Psichiatri, M., 2012. Are Internet use and video-game-playing addictive behaviors? Biological, clinical and public health implications for youths and adults. HHS Public Access, 53(3), pp. 153-170.

Scott, D., 1994. The Effect of Video Games on Feelings of Aggression -. The Journey of Psychology, 129(2), pp. 121- 132.

SHIGEKAZU HIGUCHI, Y. M. Y. L. A. M., 2005. Effects of playing a computer game using a bright display on presleep physiological variables, sleep latency, slow wave sleep and REM sleep. Journal of sleep research, 14(3).

This Is the Most Effectiveness System for all patients and physicians. (Pharmacy Buddy System)

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Abstract

Often people try to get all of their prescription medications at the nearest pharmacy. In this case, many people face lots of problems. The reason is that we cannot buy all the medicines from the same pharmacy. There for A website is to be developed to overcome this problem. This site helps people to find out if their medicine is available at the nearest pharmacy. It also shows the distance between the pharmacies in the area (from the pharmacy where that person is). Considering that distance, people can pick up the next pharmacy in their prescription and pick up the nearest pharmacy.

Index Terms

Web Application, Pharmacy Details, Database, GPS, Prescription Review, Comments Mining; BUIR Apache, MySQL.

Introduction

This is the Software Requirements Specification (SRS) for the PBS (Pharmacy Buddy System). The purpose of this document is to convey information about the application's requirements, both functional and nonfunctional, to the user. This document provides:

- (a) A description of the environment in which the application is expected to operate.
 - (b) A definition of the application's capabilities.
 - (c) A specification of the application's functional and nonfunctional requirements.
- 1) First, it is anticipated that the SRS will be used by the application designers. Designers will use the information recorded here as the basis for creating the application's design.
 - 2) Second, the client for the project, the library manager in our case, is expected to review this document. The SRS will serve to establish a basis for agreement between the client and development team about the functionality to be provided by the application.
 - 3) Third, the application maintainers will review the document to clarify their understanding of what the application does.

According to the document present information oriented to the developers, designers, project manager and other sophisticated individuals related to the project. It means gives the specific requirements of "Pharmacy Buddy system". This comprise of External interface requirements, classes or objects, performance requirements, design constraints and software system attributes as reliability, availability, security and maintainability.

Main purpose of this section is to assist project team with overall functional and non-functional requirements of the project. So that decision on further improvements and developments can be made easily.

Our free time is an incredibly valuable resource [1]. All our efforts to rationalize and optimize its usage, only lead to the more pronounced feeling of the time deficit [2]. Typically, we allocate only a scant amount of time for such an important subject as caring for our health, so visiting a doctor for consultation or the prescription of medicine is often avoided and performed only in dire need [3]. According to statistics, only a third of pharmacy customers actually know what medicine they have come for. Among them approximately 10% heard about medicine from advertisement, for 40% it was prescribed by doctor, and the rest used recommendation of pharmacist or acquaintance [4]. Thus, an average customer of pharmacy needs information resources to support his decision for medicine purchase in a timely and objective manner, taking also in consideration customer location and his means. People often need a medicine without prior planning, at need [5]. Often they cannot use the full version of pharmacy network website. Such websites typically don't provide the service of recommending purchase from other network or from pharmacy.

located near the customer [6]. Nowadays customers are accessing commercial services using Web application more often than stationary computers [7]. The adaptation of web-application to platform interface along with storing and analyzing information about prior searches simplifies the process of information consolidation taking in consideration the customer's needs [8]. This trend should be also followed by pharmaceutical market in our country, which is still based on antiquated solutions and needs innovations [9]. Our work aims to create a general architecture of intellectual system for customer support in PBS pharmacy networks, which will allow to obtain the sufficient information about availability and purchase of medical medicines. This system will be able to provide such services:

Literature Review

At the core of every system's efficiency is the availability of services because very often users rate the whole system performance depending on the satisfaction they get in using such services. To meet users' needs and expectations, almost every online Pharmacy Buddy System (PBS) has a myriad of services.

When the consumer is unable to obtain their medications from one pharmacy, by specifying the medication and the quantities available to him through the web application through the pharmacist, you can find the nearest pharmacy with that medicine. Also you can get the medicine via web application, supplier through a SMS when that medicine out of stock or nearly end of stock at the pharmacy

1. Star ratings give users or customers the opportunity to express their opinion about a product, service, or company in just one click. The five-star rating system has established itself as a standard when it comes to rating options. One star indicates a poor product, and five stars means it's excellent. [10]

This rating system is similar to YouTube's 'thumbs up' and 'thumbs down' principle and

has similar advantages and disadvantages: On the one hand, it offers a very fast and easy way for users to leave feedback, but on the other hand, no opportunity to go into more detail. There's only the option of 'I like this' and 'I dislike this' – but no opportunity to explain your choice. [11]

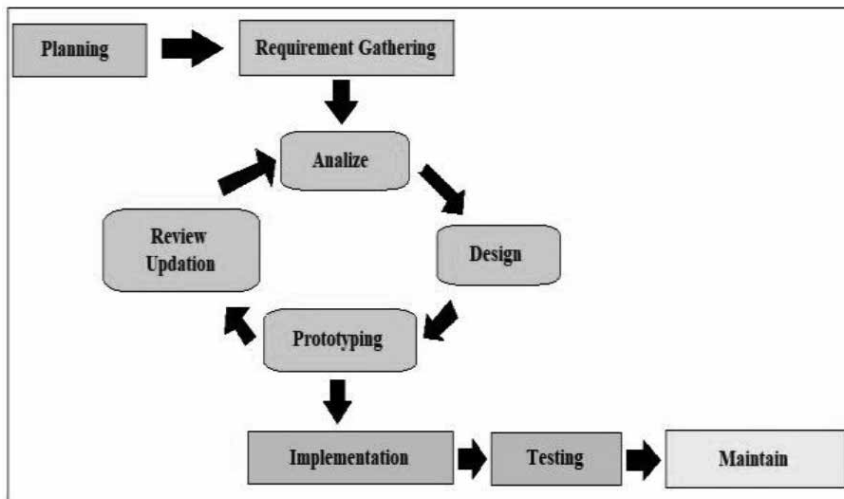
Depending on the type of rating system, there are very different ways of integrating ratings into websites: the easiest way to do this is by using the functions included in shop and content management systems (CMS). Many systems have an equivalent function or at least provide separately installable plugins for integrating rating systems. In addition, there are simple generator tools that create corresponding HTML code in just a few clicks. The code can then be copied and integrated. Star ratings can also be written manually.

2. Users can explain 'why' they left their rating in the comments section, which is usually offered in the five-star system. Users and/or customers have the possibility of not only giving a rating, but also explaining the reason behind it. They can also suggest wishes and improvements. Comment boxes give you the opportunity to react to suggestions and post answers to queries. [10] [11] [12]

Reviews are a popular way of evaluating – usually products in online stores. Amazon has a constantly growing review archive on lots of products, thanks to contributions from their huge user base. There's an abundance of information and progress reports on numerous articles, from short comments, to semiprofessional reviews.

Researches	GOFRUGAL	MEDITAB	CoverMyMeds	SRS INTEGRATION
1. Web application control.	✓	✓	✓	✓
2. Add comment/ views for Each Pharmacy	X	✓	X	X
3. Notification time	✓	X	✓	X
4. Software updates (Software updates shall be available from the internet)	✓	✓	✓	✓
5. Emergency power supply	✓	✓	✓	✓
6. Finding the nearest pharmacy	X	X	X	X

Methodology



For this research used Prototype Methodology. The main reason to use Prototype methodology is because it is easy to get a clear idea about the application and the practical issues that can be happened during the development of the web application. Analysis, design, prototyping, and review updating phase are concurrently performed by the prototype methodology, and all three phases are repeatedly performed in a cycle until the system is completed.

We are developing a PBS System for Patients and Physicians. In our system When the consumer is unable to obtain their medications from one pharmacy, by specifying the medication and the quantities available to him through the web application through the pharmacist, you can find the nearest pharmacy with that medicine. Also you can get the medicine via web application, supplier through a SMS when that medicine out of stock or nearly end of stock at the pharmacy.

Results and Discussions

The Proposed Ranking Algorithm is providing the relevant result set to the users of the internet according to the query or keyword specified by them. The algorithm proposed is considering the joint probability of web page and query with respect to the Ontology to consider the concepts and relationships that exists between the concepts. This algorithm will also help the user in terms of both time complexity and accuracy. The next generation web, the semantic web will access the database of web documents which are stored in the form of ontology and match the keyword entered by the user to provide useful information and to help extracting information which is hidden behind the web. The Ranking strategy used by the algorithm will show the result set that best matches the user query on the top of the web pages using the search engine and the other information related to the query will be displayed on the bottom of the web pages. We will also try to make our approach more scalable by making the ontology construction an automatic process.

Conclusion

In these days infectious diseases are rapidly expanding. In addition to that relevant authorities cannot detect relevant areas at the first stage of that infection is spread. Because of that most people can be affected by those diseases. Not only has that but also, people who came to those areas by outstations. So that, there should be an application people want to know that what areas are affected by the infectious diseases. Using Google location service the affected areas are indicated. Also, this application connects with the relevant authorities. Then they can also add some details about that area current situation of areas. So, this proposed android application will help to overcome these problems.

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References

- [1] Mobasher, B.: Data mining for web personalization. In: The adaptive web, Springer, 90- 135 (2007)
- [2] Dinucă, C.E., Ciobanu, D.: Web Content Mining. In: University of Petroșani, Economics, 85 (2012)
- [3] Xu, G., Zhang, Y., Li, L.: Web content mining. In: Web Mining and Social Networking, Springer, 71–87 (2011)
- [4] Jivani Anjali Ganesh: A Comparative Study of Stemming Algorithms. In: Int. J. Comp. Tech. Appl., 6, 1930-1938 (2011)
- [5] Su, J., Vysotska, V., Sachenko, A., Lytvyn, V., Burov, Y.: Information resources processing using linguistic analysis of textual content. In: Intelligent Data Acquisition and Advanced Computing Systems Technology and Applications, Romania, 573-578, (2017)
- [6] Shakhovska, N., Vysotska, V., Chyrun, L.: Features of E-learning realization using virtual research laboratory. Computer Sciences and Information Technologies, 143-148 (2016)
- [7] Shakhovska, N., Medykovsky, M., Stakhiv, P.: Application of algorithms of classification for uncertainty reduction. Przegląd Elektrotechniczny, 89(4), 284-286. (2013)

- [8] Schahovska, N., Syerov, Y.: Web-community ontological representation using intelligent dataspace analyzing agent. In CAD Systems in Microelectronics, 2009. 10th International Conference-The Experience of Designing and Application, 479-480. (2009).
- [9] Shakhovska, N., Vovk, O., Hasko, R., Kryvenchuk, Y.: The Method of Big Data Processing for Distance Educational System. In Conference on Computer Science and Information Technologies, Springer, Cham, 461-473 (2017)
- [10] A.Kemafor, A. Maduko, and A. Sheth. "SemRank: Ranking Complex Relationships Search Results on the Semantic Web." Proceeding WWW '05 Proceedings of the 14th International Conference on World Wide Web. 117-27, 2005.
- [11] A. Pisharody and H.E. Michel, "Search Engine Technique Using Keyword Relations," Proc. Int'l Conf. Artificial Intelligence (ICAI '05), pp. 300- 306, 2005.
- [12] B. Aleman-Meza, C. Halaschek, "A ContextAware Semantic Association Ranking," Proc. First Int'l Workshop Semantic Web and Databases (SWDB '03), pp. 33-50, 2003.



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Session 03

Engineering

A mathematical model to determining the quantities required for the estimation of labour work in the construction industry

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Abstract

The construction industry is a labour-dependent industry even though there exists new technologies and machineries. Research have been carried out to identify solutions and techniques to improve the efficiency of the construction industry. Cost, time and quality are the factors determining the success of construction projects. Estimation of resources, time, money and labour required is a critical task as it is necessary to monitor and maintain the project's progress. This study aims to develop a method to estimate the quantities required for construction work through a mathematical modeling approach.

To develop a method to measure the efficiency of labour work, three work types were considered to record the time-spent to complete a task under different scenarios. The factors affecting the time-spent such as work height, number of labourers involved, skill level of labourers etc. were also identified and recorded. The data collection was conducted at multiple construction sites. Then, a mathematical model was developed to estimate the quantities required to complete a given task. The method was further analyzed to study the possibility of applying such a method to the real-world requirements.

The results of the study were promising and indicated practicality of the method. The proposed approach can successfully model the labour work of a given construction project and estimate the resource, money and time requirement. The advantage of this method is that it can be further extended as necessary to suit user-specific requirements to cater into dynamic demands of the project planning and management matters.

Keywords

Labour Efficiency, Labour Productivity Rate, Labour Work Estimations, Linear Regression Analysis

Introduction

The construction industry requires a significant amount of precise planning and estimation to avoid generation of disbenefits to its stakeholders. Particularly, cost, labour, time and resource requirements must be accurately estimated to plan and monitor the progress of a project. However, a sophisticated solution in this regard is yet to be developed. Therefore, this study aims to develop a mathematical model to aid the estimation process to increase its credibility and reliability. It is intended to introduce a calculate and present

the unknown parameters of a given task where there are some parameters with known values.

Literature Survey

A research which has been conducted by connecting the productivity of labourers with motivational factors has shown prominent findings (Rangika Halwatura, 2015). Many related factors have been proposed or identified but still the efficiency of labour work has not been studied properly (E. Rojas, 2003). An effective method to measure and utilize the labour efficiency and productivity is to have quantities for the variables. The estimations should be more into learning algorithms as they can provide better results than static methods.

Research Methodology

A preliminary study was conducted to identify the works directly carried out by labourers in the construction industry. Plastering, brick and tiling works were considered for the data collection. The characteristics of the work conducted were identified and recorded. Following are the considered characteristics of this study,

- Time taken (measured on site)
- Total numbers of labourers (skilled, unskilled and helpers)
- Work height (height from the floor level)
- Work area (wall, floor, slab and staircase)
- Distance (distance from material on the site)
- Working time period of the day (before lunch or after lunch)
- Type of material (e.g.: clay brick or concrete block)
- Size of the wall (4.5-inch, 9 inch and 18 inch)

The time-spent was measured to finish the 1 m² of each work. All the collected data were analyzed by using SPSS modeler. In every scenario, there were both dependent and many independent variables. A linear regression analysis was done to prepare a model to establish a general formula to estimate a given scenario. The final model generated from the analysis was evaluated with field data for verification.

Results and Discussion

The R squared values of each respective works; plastering, brick work and tiling were 0.762, 0.691 and 0.696. In this case, the reason behind the marginally low R squared values were the unpredictability of the human behaviour. However, with further inclusion of more parameters and precise data collection, this algorithm can be improved. A verification of the model was done with field data and then comparison was done with the figures available in building schedule of rates (BSR).

Equations

Derived equations from the linear regression analysis model are as follows for each labour work,

$$\text{Eq. (1) } \textit{Timetaken} = 42.36 - 6.226T + 7.874H + 8.9A + 6.17D + 11.36P$$

Model for brick work:

$$\text{Eq. (2) } \textit{Timetaken} = 73.48 - 11.14T + 8.67B + 13.96S + 13.24H + 7.734D + 11.93P$$

Model for tiling work:

$$\text{Eq. (3) } \textit{Timetaken} = 101.79 - 18.14T - 1.649A + 13.15H + 8.54D + 7.485P$$

Where,

T = Total No. Labourers

H = Work height (m)

A = Work area

(1 – Wall, 2 – Slab, 3 – Staircase)

B = Brick type

(1 – Burnt clay brick, 2 – Concrete block)

S = Size of wall (1 – 4.5", 2 – 9", 3 – 18")

D = Distance from material / store (m)

P = Work time period

(1 – Before Lunch, 2 – After Lunch)

Conclusion

The approach was successful and effective in determining the requirement of labour work required to finish a particular work. This method can help optimize the utilization of resources to finish the tasks within the desired timeline. Any drawback the conventional method had related to the relevancy of the estimation method has now been eliminated. This study can be modified with Machine Learning and other data science concepts. If properly developed, the construction companies can maintain their own database to employee this type of a model to predict the requirements in a highly effective manner. This strategy will improve the efficiency of the construction industry overall. The timeline of a project, schedule planning and also the cost estimation can be done precisely and accurately.

References

Aynur Kazaz, T. A. B. E., 2016. Comparison of Theoretical Man-Hour Values and Practical Man-Hour Values in Turkey. *International Journal of Advances in Mechanical and Civil Engineering*, pp. 2394-2827.

Duncan, J. R., 2002. *Innovation in the building sector: Trends and new technologies*, Wellington: IPENZ Convention.

E. Rojas, P. A., 2003. Labor Productivity Drivers and Opportunities in the Construction Industry. *J. Manage. Eng.*, 19(2), p. 78–82.

Edom Atomen, O. C. C. I. K. E. O. S. S., 2015. Labour Productivity in Construction Industry in Nigeria: Case of. Civil and Environmental Research, pp. 28-33.

Rangika Halwatura, P., 2015. Critical Factors which Govern Labour Productivity in Building Construction Industry in Sri Lanka. PM World Journal, pp. 1-13.

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An approach to evaluating the performance of highway infrastructure under peak traffic conditions using micro-simulation

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Abstract

Evaluation of the existing roadway infrastructure is a major requirement in transport planning. Analysis, design and upgrading of transport and urban infrastructure are done with the findings of such evaluation studies. However, due to various uncertainties and the difficulty of forecasting involved in the conventional traffic analysis techniques, their results are considered less accurate. In modern transport research, micro-simulation is being used as an efficient and effective study approach in this regard. This research is focused on developing an approach to evaluating the performance of existing road infrastructure to aid planning, designing and decision-making procedures. A scenario analysis was done to demonstrate the possible ways of applying the proposed method to industrial needs.

A case study was done in the city of Colombo with a selected road section of an arterial road. A micro-simulation model was developed from manually recorded data and the model was simulated using various scenarios. Micro-simulation would require a set of data and different tweaks and fine tuning in order to perform well and behave in the same manner as real-world observation. The data required was identified and collected using manual methods. The scenario analysis simulated the various changes and improvements that can be done to the infrastructure and traffic management strategies in order to reduce the congestion. Also, necessary variations were introduced to the model to identify the extent to which these changes would ease the congestion. Validation of the study was done by comparing the model's outputs with field observations.

This approach successfully identified and laid out a comprehensive framework for studying a road network for performance evaluation and decision-making on required upgrades. The outputs of this technique enable the authorities and regulators to make rational and more relevant decisions. Since, this is a quantitative method, the calculations can also be carried forward for any future studies done on the same infrastructure.

Keywords

Micro-Simulation, Scenario analysis, Transport Infrastructure, Transport Planning.

Introduction

The number of vehicles in Colombo is increasing at a rate of 508,000 vehicles per year at present. It has been found that there is a significant economic loss due to congestion. Especially the intersections are seen heavily congested during peak hours. The objective

of this research was to develop a framework for the simulation and modelling of busy intersections for peak hours, which is versatile enough to be used for any other busy intersections as well., A micro-simulation approach is used to study the traffic flow of a selected area to quantitatively compare the benefits of an infrastructure change in the intersection.

Literature Survey

PTV Vissim is far superior as a micro-simulation software due to various factors as determined by Avramovic & Johnsson (2017). A study conducted by Dong Lin (2013) was instrumental in developing a research methodology for this research. In order to identify the aspects of the model and the simulation study, findings of previous studies were utilized.

Research Methodology

Traffic flow volumes, vehicle compositions, vehicle occupancy, turning movements, traffic light timings were collected at a selected road intersection of an arterial road. The network was modelled using satellite imagery. Driver behavior was modelled according to a study conducted to identify the driver behavior model in mixed traffic by Manjunatha (2012). For validation, queue lengths were measured periodically at the intersection. These measurements were then compared with the outputs of the model. Following, the model's inputs were tweaked further. The calibrated model was modified to simulate different conditions for the year 2030 with the vehicle growth calculated using growth rates presented by Asian Development Bank (2009).

Results & Discussions

The results of the scenario analysis done for 2030 are summarized and illustrated in Figure 1.

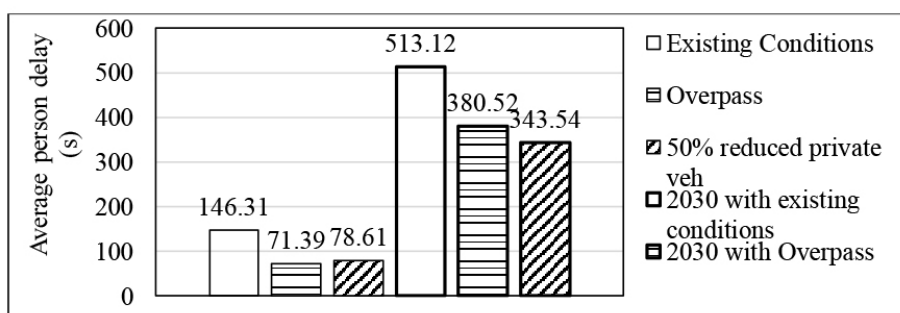


Figure 1: Results of the simulations done for different conditions expected in 2030. It was found that the increase in average delay in the system can be reduced by almost 25% through the implementation of the solutions given in the respective scenarios.

Conclusion

This research outlines a workflow to model and simulate traffic flow conditions using micro-simulation. This method is applicable for any small-scale analysis that micro-simulation can be used for. The proper planning and identification of the best possible scenarios would be extremely important in the case of something as unpredictable as traffic.

References

- Asian Development Bank, 2009. Economic analysis (Sri Lanka: Northern Road Connectivity Project), s.l.: s.n.
- Avramovic, S. & Johnsson, E., 2017. Evaluation of Autodesk InfraWorks 360 and PTV Vissim - A comparative study of two traffic simulation software products, s.l.: s.n.
- Department of Census and Statistics, 2016. Household Income and Expenditure Survey 2016, s.l.: s.n.
- Department of Motor Traffic, 2018. Registered Motor Vehicles, 2014-2018, s.l.: s.n.
- Jayasooriya, S., 2017. Measuring the Economic costs of traffic congestion, s.l.: s.n.
- Kumarage, A. S. & Weerawardana, J., 2009. Greater Colombo Traffic Management, Moratuwa: University of Moratuwa.
- Lin, D., Yang, X. & Gao, C., 2013. Vissim-based Simulation Analysis on Road Network of CBD in Beijing, China, Beijing: Elsevier.
- Manjunatha, P., Vortisch, P. & Mathew, T. V., 2012. Methodology for the Calibration of VISSIM in Mixed Traffic, s.l.: s.n.
- PTV Group, 2019. PTV Vissim First Steps Tutorial, Germany: PTV Group.
- Registrar General's Department, 2019. Mid-year Population Estimates by District & Sex, 2014 - 2019, s.l.: s.n.

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Offering engineering education with standards during the time of pandemic in Sri Lanka

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Abstract

Covid – 19 pandemic has impacted all the aspects of people's life worldwide in terms of social life, economy, administration, professional life and education. As medical and healthcare professional are still struggling to find a successful solution for the disease, the authorities and governments are trying to simplify the people's life in all aspects while ensuring the safety of everyone. Sri Lanka, as a developing country, has to face this challenge and has to assure that no decline in the growth, stability and economy of the country. All the departments and the authorities in the country are trying to beat the challenges in their relevant field. In case of education, more than 75% of the students get the free education (primary, secondary and higher education) which is offered by the government. This study looks in to the challenges ahead of delivering the education, with required standards, during this pandemic, especially in engineering education and also goes for suggestions to overcome those challenges. It is also important to realize that the delivery of education should not be interrupted not just due to this pandemic, but in any causes as the education is the backbone for the country's growth in all means. This document looks for recommendations for an education system which will always be deliverable and accessible by everyone in Sri Lanka with no economical, technical and health barriers.

Keywords

Pandemic, Education, Engineering

Introduction

Education is the key for the betterment of society. In Sri Lanka the education system is mainly intended for a professionally secured life. Education is state funded and offered free of charge at all levels; from school to university level. Literacy stands at 97%. There are more than 10000 schools in Sri Lanka and all the children have the access to free education. In case of higher education, 15 national universities and 7 postgraduate institutes offer courses in many disciplines such as healthcare, commerce, science and engineering. These universities are managed by University Grants Commission (UGC) and Ministry of Education. Among the state universities, six universities offer engineering related degrees. In addition to that there are many higher educational institutes which offer engineering related technical courses in certificate, diploma and degree levels under State Ministry of Skills Development, Vocational Education, Research and Innovations. Few private and semi government institutions too offer engineering related diplomas and degrees. University Grants Commission (UGC) and Tertiary and Vocational Education Commission (TVEC) are the bodies which regulate and monitor the Degree programs

and other vocational level study programs (Diploma, Certificate levels). Institution of Engineers Sri Lanka (IESL) and Engineering Council Sri Lanka (ECSL) are the bodies which regulate and standardize the engineering education and professional engineering practices to be on par with global standards. But in this time of pandemic, delivery and access of education becomes complicated with traditional or conventional methods as it is difficult to maintain health measures. Especially engineering education is all about practical stuff and it deals with hands on experiments and practices. Here it is a question how academic activities of an engineering/technical institute can be done without failing to meet recommended standards in delivery.

Background

Gathering of people is not recommended these days. Thus all the schools and educational institutions are trying deliver their courses through online teaching/learning platforms. But still following challenges are ahead of success full teaching and learning.

1. Unfamiliar tools:
Not all the students and academics are familiar with or good at online tools.
2. Economy/cost:
It is a questionable that will every students have the access to internet and laptops. In Sri Lanka, not every parents a can afford a laptop/ computer or internet to their child. Especially in this time of epidemic most of the people have lost their job or couldn't continue their jobs/ businesses. This brings more economic tightness. In families which struggle to have enough food and other basic needs, access to these learning materials is unimaginable.
3. Network strength and stability:
Regardless of the cost factor, students and educational institutes have to face the network strength/stability issues. Some part of the country does not have a strength internet coverage to take part actively in online teaching/learning. Even in the regions where network strength is good, the stability is the next issue. Availability of stable is still a problem in many parts of the country. Power outages also causes interruption in internet access.
4. Unpleasant environment for teaching and learning:
It is not sure that everyone will have a pleasant and peaceful environment for concentrated/ focused teaching and learning in their home or surroundings.
5. Interactive education:
Effective interaction between the teacher and student is the key for successful teaching in formal class rooms. It is the responsibility of the teacher/lecturer to make his sessions interactive and to ensure the active participation of each student in learning activities. But with the online education, in virtual classrooms this becomes a problem with lots of students.
6. Conducting practical and experiment sessions:
This is a major concern in science/engineering related courses. Experiments and practices should be done physically to achieve their relevant goals.
7. Assessing and evaluation:
Schools and state universities mainly evaluate their students based on examinations. But it is not advisable in these conditions.

Discussion

If we look in to the challenges listed above one by one,

1. 'Unfamiliar tools' is not an acceptable excuse for engineering students or teacher/lecturers, because it is the basic requisite of an engineer is to explore and adopt to the technological advancements. For the other disciplines it is barrier for teachers and students, anyway continuous usage and experience make these familiar eventually.
2. In terms of economy and cost, all internet service providers in Sri Lanka provided free internet access for university learning management systems and remote learning facilities through the Lanka Education and Research Network (LEARN) based on an agreement with Telecommunications Regulatory Commission of Sri Lanka (TRCSL) and UGC. Also internet service providers gave the access to online learning platform with discounted prices. But still it is difficult for the students who does not have a computer or for the families with low/no income. It is the duty for relevant authorities arrange the access to learning tools for the economically backward students, at least there should be a mechanism to gather only the students who have this difficulty, and for providing the computers and internet access in schools/institution or a common place with proper health measures.
3. Network strength and stability is important not only for the education, but also for other businesses, administrations and organizations since every organization has been changed to work from home basis. Therefore it is the obligation of the internet service providers to ensure the network strength and stability. At the same time educational organizations also can schedule their session as distributed over the course of the day, means from 6.00 AM to 8.00 PM or as convenient to the participants.
4. Unpleasant environment for teaching or learning can be a challenge for many individual who deal with virtual/online education from their home/habitat. But continuous access to Learning Management System or online materials and for recorded lectures sessions may minimize this challenge as the teacher/lecturer can deliver and student can access the materials in convenient /peaceful time. But both the teacher and student must have commitment for this.
5. Achieving interactive learning environment in education is again requires the personnel commitment and involvement of students and teachers/lecturers. Both the students and teachers should have clear understanding on their roles and learning outcomes/goals. This can be achieved by task based delivery instead of conventional teaching. Students can be instructed to complete a set of tasks based on subject learning outcomes such as research on required topics, individual presentation and group discussions. This may seems time consuming but the learning/teaching will be more interactive and the results will be efficient.
6. Conducting practical and experiment session is compulsory and cannot be skipped in science or engineering/technical education. These sessions should be conducted as groups/batches in proper time spans while maintaining health precautions. At the same time when, lecture session are conducted online or when students learn online, it is good to use simulation tools wherever possible.
7. In the assessment and evaluation of students based a set of learning outcomes relevant to a subject/module, national universities and schools relay mainly on examinations even though they use some other assessment methods in small scales. But in this pandemic situation it is not practical to conduct examinations physically. Online examinations are also not preferable because of problems with access to

stable internet connection, proper invigilation and conducting exam in pleasant atmosphere. This brings the necessity for an alternate evaluation method in schools and higher education. Some private universities and international universities use task/assignment based evaluation system which assigns a list of tasks to achieve the desired outcomes/skills/competencies thus if the student completes the task, he can be assessed to have achieved the corresponding outcomes/skills/competencies. State universities and schools can also look for introducing such evaluation system which asks the students more involvement than just writing the exams.

Conclusion

'Student/Learner Centered Learning' has been discussed for a long time in Sri Lanka. But it is not practiced in schools and universities. This is the high time to understand the need of 'Student/Learner Centered Learning' and not just to discuss but to implement sooner. With advancements in technology and by providing computer and internet access to students these 'Student/Learner Centered Learning' become easier.

Each universities can try to implement such system step by step within their limits at least as an experiment to assess the practicability of such 'Student/Learner Centered Learning' system. They can also give recommendations to relevant authorities and bodies to step ahead towards 'Student/Learner Centered Learning', this will enable the authorities and bodies to implement and make educational policies based on 'Student/Learner Centered Learning'.

'Student/Learner Centered Learning' is where student understands his role and responsibility, which will make the student to be focused in his studies under minimum observation/monitoring.

References

1. 'COVID-19 pandemic and school education', Sri Lanka Journal of Child Health 2020, 49(3), p207- 209.
2. Natasha Dissanayake, (2020) The Educational System of Sri Lanka [Online]. Available at:
http://www.fulbrightsrilanka.com/?page_id=609 (Accessed: 17 December 2020)
3. (2020) Policy Brief: Education during COVID-19 and beyond. United Nations.
4. Ryotaro Hayashi, Marito Garcia, Angelica Maddawin and Hewagamage, K.P. (2020) Online Learning in Sri Lanka's Higher Education Institutions during the COVID-19 Pandemic. Asian Development Bank.
5. (2014) STUDY ON THE DEVELOPMENT OF LEARNING ENVIRONMENT IN GENERAL EDUCATION IN SRI LANKA. Sri Lanka: National Education Commission.
6. Natasha Dissanayake, (2020) The Educational System of Sri Lanka [Online]. Available at:
http://www.fulbrightsrilanka.com/?page_id=609 (Accessed: 17 December 2020)

Discover The Optimisation Method To Reduce The Geometry Of The Slab And Beam By Using Novel Material Techniques In The Building Structure

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Abstract

Different optimization tools have previously been used as novel techniques to optimize composite beams and composite floors for cost and weight effective design. In this study, the size optimization technique ABAQUS is presented to test different novel material design techniques along with Australian standards. There are different processes to decrease the geometry of the beam, embodied energy is to be assessed in each design to decide each relationship. It shows that a cellular beam with a green concrete slab gives 33% and 41% respectively reduction of embodied energy compared to the steel-concrete composite beam and fully concrete beam and slab. Also, 69% decrement in weight compared to the traditional steel-concrete composite beam. This paper will discuss that it could be saved 400mm height on each floor while using this optimized cellular green concrete composite beam.

Keywords

Embodied energy, Novel Materials; Material Optimization; Composite beam; ABAQUS

Introduction

In recent years, the initiative to become green is globally underway. Both the sustainability and optimization theories have become parallel development topics with various designs, techniques, and tools. Practicing optimization algorithms and techniques to achieve sustainable development have the highest importance (1). Accordingly, several actions are undertaken by each industry to lower its environmental footprint. One of the most influencing methods is sustainable building practice. Hence, the construction industry prefers sustainable buildings to the traditional ones to decrease the environmental negative impact and to achieve sustainable development. In that case, the building design and the choice of materials are centralized by the Engineers to develop the living conditions of occupants (2).

Background / Literature Survey

The exploration to create novel building materials still in processing to promote environmental sustainability (7). As the market demands low material usage along

with cost-effective and environmental-friendly buildings, the usage of novel materials is increased in the present era. Novel technologies improve the physicochemical properties of construction materials at low costs (8). Nature analogy software algorithms SKO (soft kill option), CAO (computer-aided optimization) MATLAB, and ABAQUS software aim to produce the optimal lightweight structures with minimal effort which can be accomplished by varying the cross-section, geometry, topology of the structures, and material properties. This enables engineers to meet the globalization, cost reductions, and structural requirements while saving time (9) (10).

According to the conventional materials, beams and slabs are normally classified as major structural elements for their load-bearing as well as the thickness properties, as it supports a large portion of the area which overlies parts of a building. Meantime, designers try to build a light structural system(13). If the largest element becomes smaller, there will be a possibility to reduce the usage of materials too. Novel materials are most effective even in a less volume so the thickness of slabs and beams can be reduced by utilizing fibre reinforced concrete, High strength concrete, Textile reinforced concrete, Green concrete, 3D printed concrete, Cellular structure, and Cold-formed steel.

In this study, an ABAQUS based optimization tool and AS 2327.1-2003 Composite Structures (14) design processes to optimize a composite beam with different novel materials for different objective functions: minimize beam cross-section; minimize slab depth; minimize weight. Candidate designs are to be assessed for embodied energy to determine individual relationships.

Research Methodology / Materials And Methods

For this study, the following Process is used in ABAQUS for size optimization are approached:

- Minimization of the composite beam section with,

Structural steel	- Process 1
Cold formed steel	- Process 2
Cellular beam	- Process 3
- Minimization of depth of the concrete slab,

Fiber reinforced concrete	- Process 4
High strength concrete	- Process 5
Textile reinforced concrete	- Process 6
Green concrete	- Process 7
3D printed concrete	- Process 8

ABAQUS is used to assess the ultimate (ULS) and serviceability (SLS) limit states of the floor in accordance with Australian design standards. It is proposed to utilize the Size Optimization Tool to tackle these process functions. The learning outcomes of this study are to be used to further refine the optimization process for composite floor and beam sections embodied energy content also includes investigating the amount of reduction of floor height and advantages to the services installations.

Structural Form

A typical 5m x 2m span floor slab has been chosen for this research. And we have two options a basic two structural forms are; A simple concrete slab, comprising a concrete beam section (Figure-1), and A modified composite beam consist of a concrete slab and a universal I- beam section (Figure-2). And also, this form of construction is common for types of building sorts, as well as high rise buildings. The beam is assumed to be simply supported and may be thought of as a primary beam spanning between 2 columns with a length of 5000mm. This composite beam shall be modified with Cold-formed steel and cellular beam to optimize the structure and also the top concrete slab can be replaced by sustainable novel materials mentioned above. At last, the embodied energy variations with a typical section shall be compared with these modified sections.

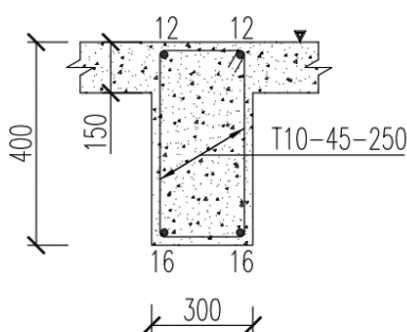


Figure 1-Typical concrete slab and beam

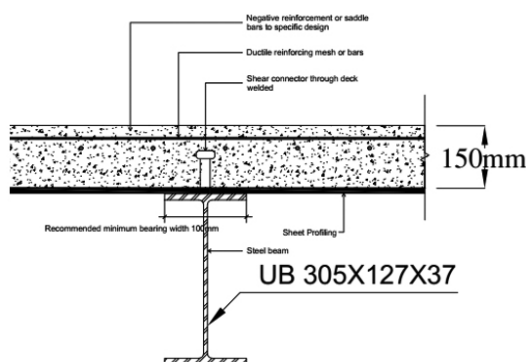


Figure 2-Modified concrete steel composite beam

Loadings

Only load cases in a gravity direction are to be considered for this work. The calculation of both permanent and variable actions is in kN/m². Permanent action g_k is calculated as the self-weight of the elements with the addition of super dead loads such as partitions (0.5kN/m²) and finishes. Variable action q_k is taken considering the usage of the building. Variable action is taken as 2.0kN/m² for domestic areas. Partial factors of safety for the permanent action γ_g is taken as 1.3, for variable action γ_{qis} taken as 1.5 from the AS/NZS 1170:2002 (15)

Design check

With the design combination of actions calculated, this is worked into design moment M_{Ed} and shear force V_{Ed} acting upon the structure, Next, design checks in accordance with AS/NZS 23271.1:2003 (14) Beginning with determining moment capacity. With the changing of thickness and material, the moment-curvature has been compared with the original material. Also, the shear capacity shall be checked in accordance with AS/NZS 23271.1:2003. In the end embodied energy can be calculated using equation [41].

Results & Discussion

In this study, an ABAQUS optimization tool has been used to minimize the geometry of various novel based materials composite beam while checking the verification of the ULS and SLS in accordance with AS 2327.1-2003 Composite Structures and AS 3600.1-2009 Concrete Structures. Additionally, Life cycle energy (LCE) is included to determine the total initial embodied energy content of the various mentioned sections.

Initially, this ABAQUS size optimization tool was used to analyze a typical concrete composite beam. The purpose of this initial design was to find the initial parameters in terms of ULS and SLS, and for embodied energy quantification. Then to begin with a composite beam a concrete-steel composite beam has been analyzed as a reference section later this steel beam and concrete slab has been modified with selected sustainable materials. The output of these design parameters has been compared with the basic concrete section. Detailed results will be discussed in the final paper.

Conclusion / Further Work

In summary, these ABAQUS optimization tools have been applied to a simply supported steel-concrete composite beam, with the best design selected from the lowest resultant initial embodied energy (33%), 69% weight reduction also gives 400mm reduction to the floor to floor height. Process 7 return a reduction in the initial embodied energy and material quantity. Process 4 and 6 naturally increases the initial embodied energy. Therefore, it is recommending that all these different sections are implemented to assess which scenario returns the minimal initial embodied energy value. Besides, it is suggested that the available novel material techniques are introduced into the ABAQUS optimization tool, and create an automated selection based on the values returned from the outputs, to assist practicing engineers with quick results.

References

- [1] Sustainability and Optimization: From Conceptual Fundamentals to Applications. Ali Sadollah, Mohammad Nasir, Zong Woo Geem. s.l. : MDPI, 2020.
- [2] A Survey of the Status and Challenges of Green Building Development in Various Countries. Yinqi Zhang, He Wang, Weijun Gao, Fan Wang, Nan Zhou, Daniel M. Kammen, Xiaoyu Ying. s.l. : MDPI Sustainability 2019, 11, 5385.
- [3] Advantages of natural renewal materials in the building sector. Sanela Klarić, Adnan Novalis, Zedina Hujdur, İsmınur Aybek. s.l. : The 3rd International Conference "The Importance of Place", At Sarajevo, 2013.
- [4] Research on sustainability of building materials. Yiming Songa, Hong Zhang. s.l. : IOP Conference Series: Materials Science and Engineering, 2018.
- [5] Life cycle assessment of building materials: Comparative analysis of the energy and environmental impacts and evaluation of the eco-efficiency improvement potential. Ignacio Zabalza Bribián, Antonio Valero Capilla, Alfonso Aranda Usón. s.l. : Building and Environment, 2011, Vol. 46.

- [6] Utilization of recycled and waste materials in various construction applications. Johnny Bolden, Taher Abu-Lebdeh and Ellie Fini. s.l. : American Journal of Environmental Science, Science Publication, 2013.
- [7] Future of civil engineering materials: a review from recent developments. Anwar Khitab, Waqas Anwar, Iman Mansouri, Malik Kashan Tariq. 2015.
- [8] Novel Technologies and Applications for Construction Materials. Gonzalo Martínez-Barrera, Osman Gencel, João Marciano Laredo dos Reis, Juan José del Coz Díaz. s.l. : Hindawi Advances in Materials Science and Engineering, 2016, Vol. 2017.
- [9] Structural optimization methods. M. Canonaco, U. Loher, V. Esslinger, B. Weisse. s.l. : Transactions on the Built Environment, 1997.
- [10] Abaqus Topology Optimization Module (ATOM) Nonlinear Structural Optimization for Improved, Rapid Product Design. s.l. : Dassault Systèmes, 2012.
- [11] Sustainable Construction: Analysis of Its Costs and Financial Benefits. Reddy, V. Sumateja. s.l. : International Journal of Innovative Research in Engineering & Management (IJIREM) , 2016, Vol. 3.
- [12] Identification of Key Indicators for Sustainable. Danso, Humphrey. s.l. : Advances in Materials Science and Engineering, 2018.
- [13] Minimum slab thickness of RC slab to prevent undesirable floor vibration. Mohammad Rakibul Islam Khan, Zafrul Hakim Khan, Mohammad Fahim Raiyan, Khan Mahmud Amanat. s.l. : The 2013 World Congress on Advances in Structural Engineering and Mechanics (ASEM13), 2013.
- [14] AS 2327.1—2003 Composite structures; Part 1: Simply supported beams.
- [15] AS/NZS 1170.1-2002 Structural design actions-Permanent, imposed, and other actions.

Thermal performance of old traditional buildings in Sri Lanka

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Abstract

This article makes an attempt to check the interior temperature variations of ancient buildings in country. Sri Lanka, that is found close to the equator, reaches the next temperature with a mean of 31° C (87.8 ° F). Therefore, Sri Lankan traditions were engineered with higher indoor comfort and natural ventilation that doesn't exist in trendy buildings. This text compares ancient buildings in an exceedingly specific region and examines the properties that have an effect on the interior temperature of ancient buildings, like the thickness of the walls, the fabric used for the roof, the gap space, the connection between the soil, etc. be analyzed in-depth taking into consideration the environmental context. The most objective of this project is to seek out the variation of indoor temperature in ancient buildings in an exceedingly specific region and to investigate the ways in which influence the sturdiness of the indoor building. As an example of ancient buildings, ancient buildings from Jaffna were elect for this project. These homes were elect within the same region and therefore the temperature within and out of doors the buildings were measured with the measuring instrument at a distinct amount and therefore the results are analyzed exploitation the COOL VENT software package. The probable results area unit a wonderful ventilation and reduced electricity consumption. This text concludes that; The thermal performance of ancient buildings permits the temperature distinction to be changed in many ways in which.

Keywords

Traditional building, Thermal performance, Indoor comfort, Natural Ventilation, COOL-VENT

Introduction

Today, people have an interest in thermal comfort. Therefore, a rise in energy demand has magnified. As cities developed, several refined instrumentation and techniques were enforced to conserve thermal influence. The results of thermal radiation is thanks to the thermal variations caused by power consumption. Buildings supported inexperienced merchandise are utilized in developing countries. Therefore, trendy homes have touched the essence of a conventional house and are replaced by innovations. Rather than flat sheets, sloping roofs were created for the thermal potency of the building, etc.

The type of masonry under construction plays a vital role as a result of the thermal insulation within the building was meted out by the masonry. There are completely different techniques and models for building walls. The distinction between the peak of the fashionable building and therefore the height of the normal building opens the method for a transparent descriptive plan of the look of ventilation and thermal insulation system.

Not solely the inside style however additionally the outside setting should be like to cool down the interior system. The trees, the grass are organized like this. Sound measures are going to be taken to gather info on the realm of the normal building and therefore the rise of contemporary buildings. Professional recommendation has been taken under consideration for these measurements. The survey is that the easiest method to gather knowledge. Ancient buildings were taken and knowledge on temperature rates were collected using thermometers. Questionnaires are ready for distribution to the overall public and knowledge are going to be collected for analysis within the table. He can meet with professionals from the realm around the ancient building and begin the analysis work and report on the work.

Background / Literature Survey

Sri Lankan cities have more population than villages, leading to rising internal temperatures and an absence of ventilation systems. Fashionable buildings are more vital than ancient buildings, that is why the look of recent buildings has been taken under consideration. Architects and engineers are operating for several years on the event of the natural ventilation and also the reduction of thermal energy consumption in fashionable buildings. "The study to assess the thermal performance of ancient buildings, compare ancient buildings with fashionable buildings and obtain the Sushil B. Bajracharya foreseen the "indoor thermal setting prediction equation" in a very magazine on the thermal performance of ancient residential buildings within the national capital valley (B. Bajracharya, 2019). "The result of passive techniques in recent buildings in state" by K. Tharanga, American state of Maryland, RNP Rathnayaka (K. Tharanga, 2009) was used as a guide for this research. The said employees analyzed the value and maintenance of buildings.

Research Methodology / Materials And Methods

In this survey, we consider the results and include the factors that minimize the temperature gradient between the interior and exterior of the building. From this research, the variation of the comparative study between internal and external temperature was recognized. In Jaffna we receive rains and sunny seasons, so variations in climate change can be represented and therefore predicted for the next few years. The studied area compares the thermal behavior of the internal and external temperature of traditional buildings. The sequence of orders to be taken.

1. 10 traditional houses in the Jaffna have been selected. That still have a good temperature balance and have fewer artificial fountains.
2. In a house, temperature measurements will be taken outside the house and at specific places in the house, such as the sky, inside bedrooms, etc. Using the thermometer.
3. Temperature readings were taken within 15 minutes from 6 am to 5 pm.
4. The same series of readings will be taken for all houses.
5. Building specifications and temperatures will be collected.
6. The information collected will be analyzed and calculated and the data will be monitored.
7. The final analysis will be done using the COOL-VENT software to find the solution to the uncomfortable areas of the building.

Results & Discussion

The different sets of 10 houses were selected for the research purpose. Figure-1 illustrates the temperature gradient of the selected houses. The reason behind the factors have been analyzed using COOL VENT is given in figure 2 and 3.

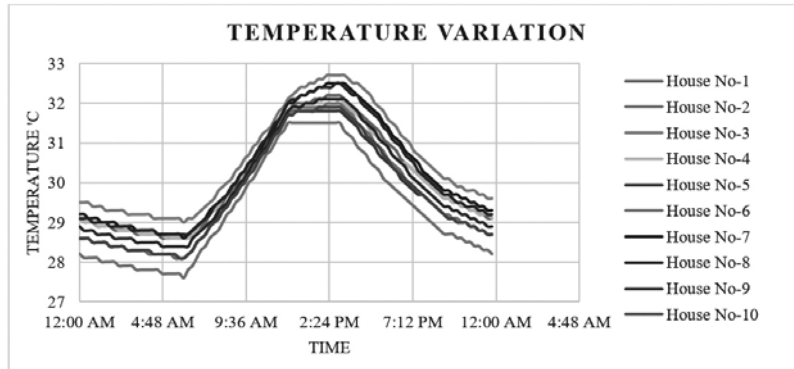


Figure 1-Temperature gradient

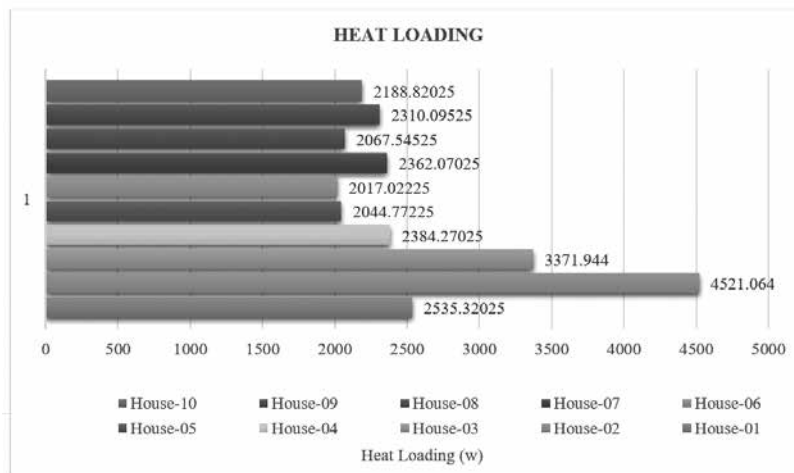


Figure 2-Thermal loading on the buildings

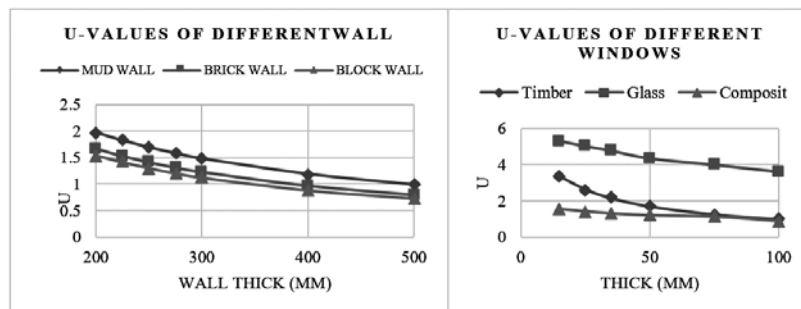


Figure 3-Proposed different combination of wall system and U values

Figure 4-Proposed different sets of windows and U values

When wall thickness increases, the Thermal transmittance(U) value starts to decrease. Also when changing the windows material thickness this U value tends to decrease in the selected traditional houses. The temperature changes in the selected houses can be seen in the figure-1 shows that at 2.20 PM we could see the peak heat loading to the building is about 33 degrees, in contrast at 5 AM the heating atmosphere of the entire building is going down, and its reached 27.5 degrees. The reason behind these changes has been investigated taking into consideration building orientation, wall thickness, wall material, size of openings, and window filling materials. The changes in those parameters are also given in Figures 3 and 4.

Conclusion / Further Work

In conclusion, the temperature gradient in the old traditional building was observed as 5 degrees Compared to new modern houses. Old type architecture gives passive lighting and ventilation to the houses that reduce the internal temperature and cool down the internal temperature. For future study, we can develop a few combinations of wall sections that reduce the internal temperature change by increasing thermal transmittance.

References

- [1] B.Bajracharya, S., 2019. The thermal performance of traditional Residential Buildings in Kathmandu valley. Volume 2.
- [2] K.C Tharanga, T. M. R. R., 2009. The Effect of Passive Techniques in Old buildings in Sri Lanka. Volume 3.

Recent Advancement And Challenges On Visible Light Communications

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Abstract

The Visible Light Communication (VLC) refers to the communication which uses the visible light source as a signal transmitter, the air as a transmission medium and the appropriate photodiode as a signal receiving component. White-light and LEDs are becoming more efficient and can be merged to many lighting applications. Due to the increased energy efficiency, it can modulate at high-speed, offering the possibility of using sources for simultaneous illumination and data communications. Light Fidelity (Li-Fi) technology is a looming facility in data communication. Li-Fi is a bidirectional, high speed communication through wireless channel by using visible light spectrum in a closed controlled environment. Recent example include car head-light based on LEDs. This paper present a survey on recent advancement and challenges on VLC.

Keywords

Visible Light Communication, LED, Li-Fi

Introduction

According to CISCO, 88% of global data traffic was consumed by smartphones and tablets in 2017, and it's forecasted that it will be 93% in 2022 as shown in Figure 1. Along with this, the development of online social services (such as Facebook and Twitter) has further increased the mobile data traffic. Higher bandwidth is required to cater the rapid growth in the data demand. It cannot be fulfilled by RF wireless communication due to its spectrum deficiency and interference issues. It leads to many researchers to look beyond RF communication and design new communication technologies.

Visible Light Communication (VLC) is one of the Optical Wireless Communication (OWC) techniques which utilize visible light for communication that occupy the spectrum from 380 nm to 750 nm. The low bandwidth problem in RF communication is resolved in VLC because of the availability of the large bandwidth. Visible light does not penetrate through walls, so it does not interfere with the other VLC receivers in the other rooms, it has the immunity to security issues that occurs in the RF communication systems. As a visible light source can be used both for illumination and communication, therefore, it saves the extra power that is required in RF communication.

Solid-state sources such as LED is required to achieve high speed switching, high data-rate. Due to the concerns about energy consumption, LEDs become the dominant source for general illumination, which make a best platform for VLC. Since the switching speed of Light Emitting Diode is less than 1 μ s [1], direct modulation, On-OFF Keying (OOK) can be done by turning the LED on and off rapidly, so human eye cannot identify

any flickering. A photo detector can be used to recover the original data.

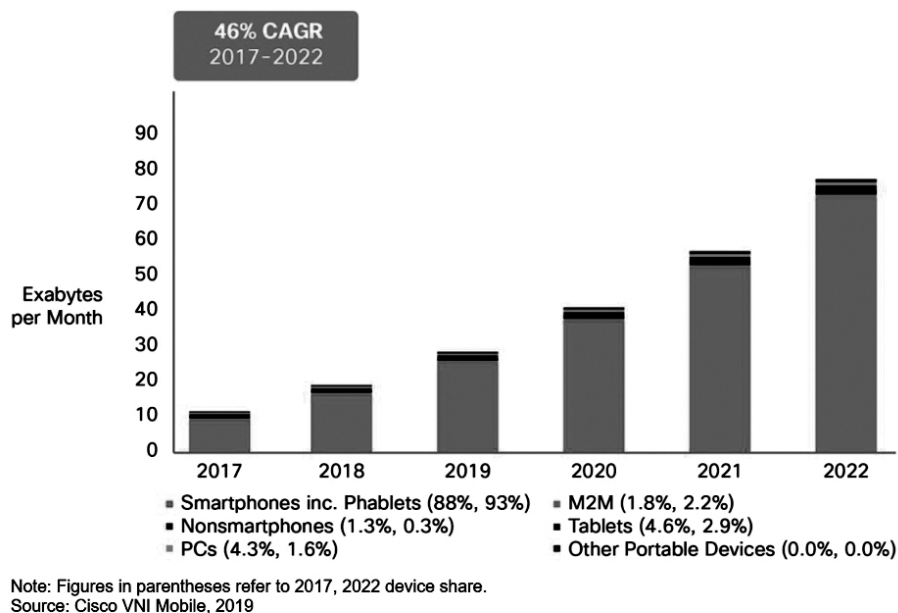


Figure 1. Global Mobile Traffic Growth by Device Type

Potential applications of VLC include Li-Fi, vehicle to vehicle communication, robots in hospitals, underwater communication and information displayed on sign boards. The Li-Fi uses visible light for communication to provide high speed internet up to 10 Gbits/s. Indoor VLC can be categorized into two categories i.e. Line of Sight (LOS) and Non Line of Sight (NLOS) [2].

Literature survey

The possibility of using visible light for short range communication is explored by many researchers. Four standards are developed that include Japan Electronics and Information Technology Industries Association (JEITA) CP-1221, JEITA Cp-1222, JEITA Cp-1223 and IEEE 802.15.7. In 802.15.7, only MAC and PHY layer are defined for short range communication using visible light [2]. The Table 1 shows the details of related works and achievements from some of the recent efforts.

Table 1. Related works and achievements in VLC

Reference	Distance	Modulation	Remark	Data rate
[3]	23 cm	OOK	Desired illumination, Blue filtering	280 Mb/s
[4]	10 cm	OFDM	Controlled illumination at the receiver	2.1 Gb/s
[5]	25 cm	NRZ OOK	16 LED array was used	40 Mb/s
[6]	10 cm	NRZ OOK	LED array with complex equalization	80 Mb/s
[6]	10 cm	OFDM	Array LEDs were used	80 Mb/s
[7]	15 cm	DTM	Multilevel modulation schemes were used.	100 Mb/s
[1]	40 cm	OOK	Normal day light, No filtering mechanism	10 kb/s
Done at SLTC and further improvements are still going	30 cm	OOK	Transmitted audio	16 Mb/s
Done at SLTC and further improvements are still going	20 cm	BPSK	Transmitted video using FPGA	100 Mb/s

Paper [3] uses OOK modulation and shows high data rate under desired illumination and blue filtering at the receiver. OFDM modulation has been used in paper [4] which results in 2.1 Gbps data rate. Papers [5], [6], and [7] were used multiple LEDs as array. But the range is small even though there is controlled illumination at the receiver. The paper [1] achieved a high data rate of 10 kbps even under normal day light condition, considering the fact that the illuminance at the receiver is the most relevant design parameter for transmission performance. Also, the range is increased to 40 cm.

The last two achievements were obtained by the final year engineering undergraduates at SLTC in 2020. One group successfully transmitted an audio file using OOK modulation technique over the range of 30 cm. The second group used the Binary Phase Shift Keying (BPSK) to transmit video file over the range of 20 cm, FPGA was used as DSP for the project.

Utilizing RGB LEDs instead of typical LEDs, and even more effective modulation techniques such as Colour Shift Keying (CSK) with Optical Multi-input Multi-output (OMIMO) are being analyzed currently at SLTC.

Findings and Discussion

The biggest challenges in implementing both LOS and NLOS indoor VLC are as follows:

1. Interference from ambient light sources
2. Interference between VLC devices

3. Inter Symbol Interferences (ISI) due to multipath propagation
4. Low Field of View (FoV) compare to Wi-Fi
5. Integration of the VLC with existing technologies, such as Wi-Fi.

The simplest way of mitigating the low bandwidth of the transmitter is to block the phosphor component at the receiver by using a blue filter. In [7] it is shown that this can increase the bandwidth substantially, albeit at the penalty of a small reduction in received power due to filter losses [8].

VLC transmitter and receiver responses are improved using analogue equalizations by using array of LEDs. Since nowadays most of the illuminations are happened using multiple LEDs, this offers the opportunity of transmitting different data on each device or on different groups of emitters.

In most cases VLC is subject to regulation by a non-communications standard. This can be an eye-safety standard, illumination regulation, or an automotive standard in the case of traffic signals or signal lights [8]. Currently there are activities in several areas. Within Japan VLCC has developed several national standards [9, 10], and the IEEE 802.15c Study Group on VLC [11] is currently working on producing the necessary documents to become a working group.

RGB LED array with OMIMO and CSK technology is a hot area of research.

Conclusion

In this paper, the key ideas and concepts of VLC have been reviewed in relationship with optical wireless communication and RF communication. The unregulated and unlicensed part of the electromagnetic spectrum is used for VLC. In applications where a visible beam is desirable for security it can provide high data rates. The recent research results and standardization activities are summarized.

References

- [1] Shamsudheen P, Sureshkumar E, Job Chunkath, 2015, Performance Analysis of Visible Light Communication System for Free Space Optical Communication Link, International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST)
- [2] S. Jivkova, M. Kavehrad, 2005, Transceiver Design Concept for Cellular and Multispot Diffusing Regimes of Transmission, EURASIP Journal on Applied Signal Processing, Vol. 1, pp. 30-38.
- [3] Vučić J. ., Kottke C., Habel K., March 2010, 230 Mbit/s via a Wireless Visible-Light Link based on OOK Modulation of Phosphorescent White LEDs., Optical Fiber Communication (OFC), collocated National Fiber Optic Engineers Conference, 2010 Conference on (OFC/NFOEC). page1- 3, 21-25

- [4] G. Cossu, A. M. Khalid, P. Choudhury, R. Corsini and E. Ciaramella, Sept. 2012, 2.1 Gbit/s Visible Optical Wireless Transmission. Optical Communications (ECOC), 38th European Conference and Exhibition on. Pages 1-3.16-20
- [5] Le-Minh, H., O'Brien-Dc, Faulkner, G., Zeng, L., and Lee, K, 2008, High-Speed Visible Light Communications Using Multiple-Resonant Equalization, IEEE photonics technology letters.
- [6] Le-Minh, H., O'Brien-Dc, Faulkner, G., Zeng, L., Lee, K., Jung, D.J., and Oh, Y, 2008, 80 Mbit/s Visible Light Communications Using Pre-Equalized White LEDs, ECOC.
- [7] Grubor, J., Lee, S.C.J., Langer, K.-D., Koonen, T., and Walewski, J.W., Wireless High-Speed Data Transmission with Phosphorescent White-Light LEDs. Post deadline session at European Conference on Optical Communications.
- [8] Dominic C. O'Brien, Lubin Zeng, Hoa Le-Minh, Grahame Faulkner, Joachim W. Walewski, Sebastian Randel, 2008, Visible Light Communications: challenges and possibilities, University of Oxford (UK); Siemens AG, Corporate Technology, Information and Communications, Munich (Germany).
- [9] JEITA, 2007, CP-1221 Visible Light Communications System
- [10] JEITA, 2007, CP-1222 Visible Light ID System
- [11] IEEE, 2008, IEEE 802.15 WPAN Visual Light Communication Study Group (IGvlc) <http://www.ieee802.org/15/pub/IGvlc.html>

Development of an analysis technique to study the effectiveness of green barriers

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Abstract

With the rapid growth of the vehicle population on roads, traffic noise has become a major issue that affects the environment and the communities living nearby. Due to the recent developments and industrialization, more road networks are being constructed in urbanised areas where the population densities are high. The noise emanated from the vehicles become hindrance to the occupants of the residential and commercial establishments alongside these road infrastructures. The sources of traffic noise are mainly vehicles horns, vibrating parts of the vehicle body, exhaust system and engine. These noises can impose a cumulative effect that rise above the specified safe decibel level for human beings and lead to health issues like mental stress, hearing impairment and sometimes heart disease. To resolve the issue of high noise levels near road networks, many measures have been introduced such as low noise road surfaces, quieter transport solutions and improved urban designs to reduce traffic volumes. Also, noise barriers are utilized in identified parts of major highways. However, the effectiveness of such should be properly studied prior to the implementation stage. This research is focused on developing a quantitative approach to studying and evaluating the green barriers for transport planning and designing purposes. Identification of impact zones is also studied in this research to aid and improve urban planning.

As a case study, a set of road sections were selected to collect data. One side of the selected road section was protected with green barrier while the other side remained exposed. The locations of the noise level recording stations were determined for either side of the road in both longitudinal and transverse directions. The noise levels were recorded with equal time intervals when vehicles were passing by. The analysis was done as a comparison using ANOVA method. The results exhibited a significant reduction in the noise levels on the side that was protected by the green barriers. A contour map was also developed to indicate the impact zones.

At the conclusion of the study, it was apparent that the proposed methodology is successful in determining the performance of green barriers. Further, this method can be applied in highway and urban planning to effectively decide the placement of road traces and residential settlements.

Keywords

Green Barriers, Hazardous Noise Levels, Highway Planning, Noise Contours, Noise Impact Assessment, Urban Planning

Introduction

Roadside noise pollution is creating significant impacts on the civil life of the people residing near roads. This can even impose health hazards and disturbances to their day-to-day activities. Hence, the authorities are keen on mitigating such issue by placing noise barriers beside the road. Green barriers are a natural way of protecting people from high noise levels. However, placement of such barriers has to be done with a proper study on the actual requirement and its extent. This study aims to develop a methodology to evaluate the effectiveness of green barriers for planning and designing purposes.

Literature Survey

There is various research work done with regards to noise reduction through green barriers that have produced promising results. Huddart (1990) has achieved a 6 dB drop in the noise level in study that was done to compare green barriers with an open area with just grass. The use of earth walls, timber or steel fences and cement walls are more effective, but they are not cost-effective and environmentally friendly.

Research Methodology

A suitable place section of a road was selected where one side of it was provided with green barriers while the other side remind unprotected. The height of the green barrier was 3.5m – 4m. Then stations were place on either side of the road; with 4m transverse intervals and 3m longitudinal intervals as shown in Figure 1. The decibel meters were placed on the stations 1.5m above the ground level to get the reading. A contours map was designed based on the readings to identify the impact zones. To compare the significance level, single factor ANOVA analysis was carried out.

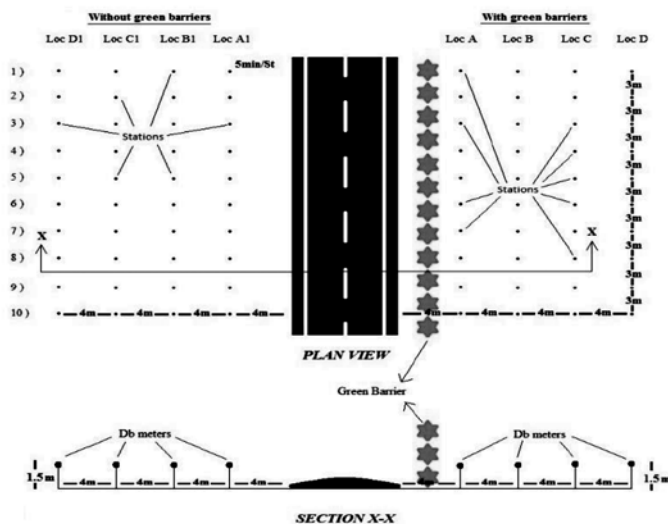


Figure 1: With Green Barrier and Without Green Barrier

Results & Discussion

Based on single factor ANOVA analysis of the 2 models, the calculated P values for with-tree & without-tree conditions and with-shrub & without-shrub conditions were less than 0.05. Hence, there is a significant difference. These results and the contour map provide evidence that the areas protected with green barriers records less noise than the areas without the barriers. Also, it was found that the density of the green barrier also affects the noise level.

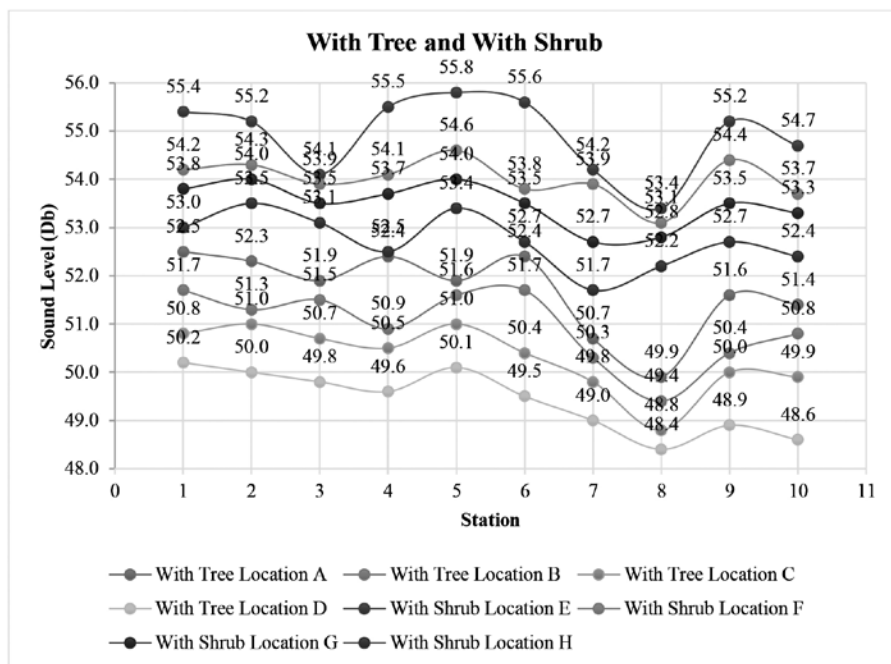


Figure 2: Sound Level Different Between with Tree and with Shrub

Conclusion

This method is successful in evaluating the effectiveness of the green barriers. The impacts of the characteristics of green barriers can also be recognized through this method. For improved road and urban planning purposes, this approach can be applied.

References

- Aylor, D. (1972) (a). Noise reduction by vegetation and ground. Journal of the Acoustic Society of America, 51(1), 197-205.
- Martens, M. J. M. Van Huet, J. A. M. and Linskens, H. F. (1982) "Laser interferometer scanning of plant leaves in sound fields", Koninklijke Nederlandse Akademische Wetenschappen, Series C, 85: 287-292.

Picaut, J. Hardy, J. and Simon, L. (1999) Sound propagation in urban areas: a periodic disposition of buildings. 60(4):4851–4859.

Kragh, J. (1981) Road traffic noise attenuation by belt of trees. Journal of Sound and Vibration, 74: 235-240.

Reethof, G. (1973), Effect of Plantings on Radiation of Highway Noise. Journal of air pollution control association, 23(3), 185-189

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Impact of polarization hole burning in optical submarine systems

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Abstract

Optical submarine systems consist of inline Erbium Doped Fibre Amplifiers (EDFAs) which is the key equipment in an optical repeater. Polarization Hole Burning (PHB) is well known Polarization Dependent Gain (PDG) to be one of the main degradation factors for single channel transoceanic EDFA chain. It is caused by an inhomogeneous gain between two principal state of polarization (SOP), and undesirable increase of an Amplified Spontaneous Emission (ASE) noise occurs after hundreds of concatenated EDFAs.

PHB effect under some conditions accumulates linearly with the number of amplifiers, and after many amplifiers PHB can become dominant than Polarization Dependent Loss (PDL), especially for low channel counts. Continuous Wave (CW) and (ASE) idlers are used to mitigate PHB in the optical submarine systems. This paper presents a detailed review on the impact of PHB in optical submarine system.

Keywords

PHB, EDFA, PDG, PDL

Introduction

PHB is well known to be one of the main degradation factors for single channel transoceanic (EDFA) chain [1]. Modern optical communication networks rely on EDFA for repeated amplification of the optical signal. Constant growth of bandwidth requirements triggers the use of the novel multi-level formats which require better OSNR, and as result, requires better understanding of and reduction of the penalties introduced by different characteristics of EDFA. One of the important characteristics is Polarization Dependent Gain (PDG), and the importance increases as polarization multiplexed formats are used [3].

Most installed DWDM systems initially operate below the designed maximum transmission capacity. Without special power management, the few initial channels will consume all optical power provided by the inline EDFAs, with possible nonlinear penalties in result. Power management in lightly loaded systems is commonly carried out by combining the data channels with idlers, sometimes in combination with reduced inline EDFA output power. Idlers, which are dummy tones transmitted along with the data channels, will consume part of the inline EDFA power, thus allowing the data channels to propagate at more reasonable power levels. Reduced inline EDFA output power is achieved by lowering the EDFA pump powers below the maximum capacity levels, thus helping to control the channel power.

Reference List

- [1] B. Bakhshi, L. Rahman and E.A. Golovchenko, 2006, Impact of Polarization Hole Burning in Lightly Loaded Ultra Long-Haul WDM Systems, OCIS codes: (060-4510) Optical communications.

- [2] Masashi Binkai, Keisuke Matsuda, Tsuyoshi Yoshida, Naoki Suzuki, Hiroki Goto, and Kenichi Uto, 2016, Evaluation of nonlinear impairment from narrow band unpolarized idlers in coherent transmission on dispersion managed submarine cable systems, SubOptics, Mitsubishi Electric Corporation, 5-1-1.

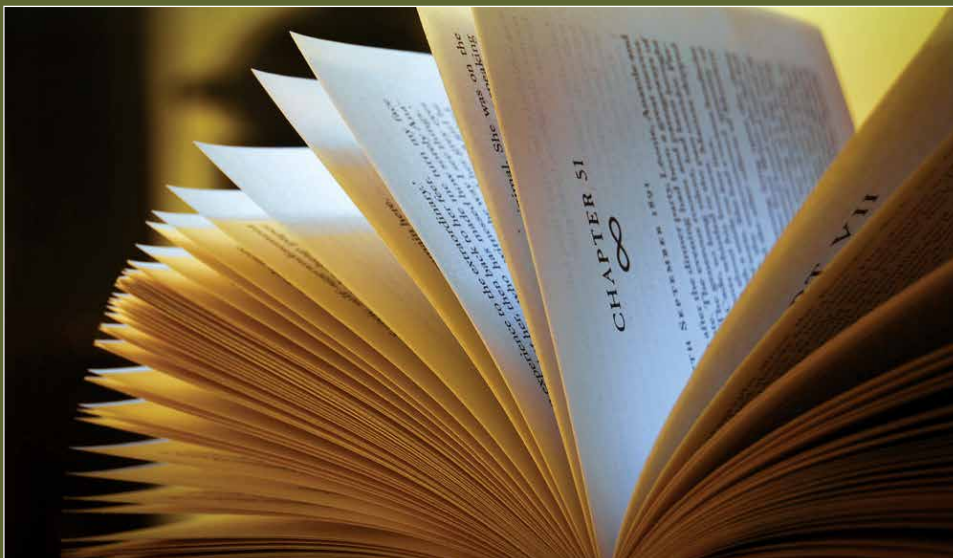
- [3] Maxim Bolshtyansky, Gregory Cowle, 2012, Polarization Hole Burning in EDFA, OFC/NFOEC Technical Digest.



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Session 04
Languages

Online Teaching to the Rescue: Teaching English during the COVID Pandemic to Students Aged 15-18 Online in an Urban Sri Lankan context

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Abstract

Online teaching provides a way to teach students whose school education is halted due to COVID pandemic. It is of pivotal importance. This study investigates the online teaching to ESL(English as a Second Language) learners. The objectives of the study are identifying perceptions of teachers and students towards online teaching, recognizing challenges of online teaching and how to overcome them and investigating efficacy of online materials. A total sample of 50 students aged 15-18 in a Colombo national school and 10 ESL teachers were chosen for the study. The information had been obtained through questionnaires and focus group interviews and observation. They were taken online. Data was analyzed using a mixed method. It was found that students face challenges due to interruption in the internet connection. Lack of formal training in teaching online cause many technical errors by teachers in online teaching. The use of online materials can be increased when shared among educators. Evaluation and Assessment of students have failed to be conducted properly in online teaching in Sri Lankan context. The most crucial aspect of online teaching is found out to be the creativity and proper management of teachers when conducting online classes.

Keywords

Online teaching, ESL learning via technology, Efficacy of online materials

Introduction

The study focuses teaching English via online to Sri Lankan students. The practicality of the 'remarkable transition' from a traditional classroom to an online classroom is investigated. In Sri Lanka students aged 15-16 prepare for Ordinary Level exam while students aged 17-18 prepare for Advanced Level exam. Even though students are restricted to their homes, they learn via online. Teachers are challenged with not only teaching online, but also preparing for major exams in Sri Lanka. Both teachers and students are forced to use the only outlet to connect as a group.

Background / Literature Survey

There are numerous discussions on online ESL learning in the recent decades. However online learning is recognized as compulsory only as it has enabled continuous learning without spreading COVID-19. Kramsch and Thorne (2002) enumerate some benefits using e-discussion in language teaching: "regular interaction with spatially dispersed interlocutors; access to expert speakers of that language of study; increased peer-to-peer interaction, the development of online discourse communities. The use of online resources have positively affected and e-learning is positively incorporated for the Sri Lankan educational context.

Research Methodology / Materials and Methods

In order to collect the required data for the study, three types of instruments: focus group interviews via zoom, and online questionnaire and observation were used. A total of 50 students and 10 teachers were incorporated as the sample. A questionnaire was administered online to both teachers and students. It contained 10 multiple choice questions. Focus group interviews were done separately with teachers and students and data were collected. The researcher acted as an observer when other teachers were conducting online classes to the students.

Results & Discussion

The investigation revealed that zoom and google classroom were used mainly in teaching online. Observation of the online classes given a 'real experience' of online teaching. There were major drawbacks in online teaching as follows; teacher fails to maintain the enthusiasm of the learners, interactive online classes are rare as teacher speaks during the whole online session, students 'merge' and 'submerge' during the online sessions which make them unapproachable.

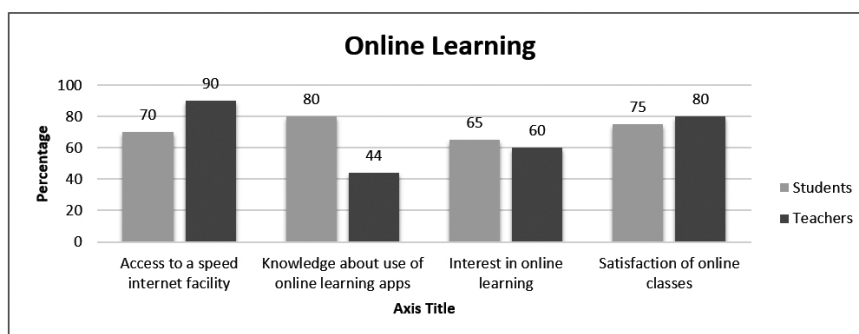


Figure 1: Teachers' and Students' responses to online learning.

According to the Figure1 90% of the students had an appropriate speed while only 70% students claim to have proper access to internet facility. The results of the interviews revealed that both teachers and students are equally eager in online learning (60%), however they were not enthusiastic as much as they were at the beginning of their online learning experience. The technological and financial constraints hold them back from using online learning more often. Moreover, it was found that the teachers were on the belief that conducting online sessions for 2/3 hours would be more productive while the students were on the view that short online sessions conducted regularly are more productive. Both teachers and students agreed that some grammar lessons which were considered tedious in a traditional classroom can be taught in a far more interesting manner. The teachers have equipped their online lessons with authentic conversations and interesting figures to teach online. The readily available online materials are used commonly by the ESL teachers to offer students a more interesting experience in learning online.

The students were on the view that mainly speaking; a major skill of English language can be done via online even though the school resumes operation. They were of the

belief that inhibition is less when speaking activities are initiated online. More students enjoy taking part in speaking online rather than in a traditional classroom.

Conclusion

The study revealed that both students and teachers are yet positioned at a 'learning curve' where practice would perfect the art of online teaching. ESL particularly could be benefitted employing online materials which attract students. Involvement of the government in facilitating online learning is a dire need. A simple training would make a tremendous change in online learning.

References

- Amir, L.R., Tanti, I., Maharani, D.A., Wimardhani, Y.S., Julia, V., Sulijaya, B. and Puspitawati, R., 2020. Student perspective of classroom and distance learning during COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia. *BMC medical education*, 20(1), pp.1-8.
- Hayashi, R., Garcia, M. and Maddawin, A., 2020. Online Learning in Sri Lanka's Higher Education Institutions during the COVID-19 Pandemic.
- Kramsch, C. and Thorne, S., 2002. Foreign language learning as global communicative practice. *Globalization and language teaching*, pp.83-100.
- Li, J., 2007. Campus-Network-Based and Computer-Assisted College English Learning System Development in China and A Study of English Language & Culture CAI Matrix. *Journal of Asia TEFL*, 4(4).
- Rashid, S., 2017. Computer Assisted Language Learning in Pakistan: Teachers' Perspectives. *Journal of Asia TEFL*, 14(4), p.802.

Effect of Modern Technology for Bilingual Students During the Covid-19 Pandemic Situation

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Abstract

Bilingual Education has become the cornerstone of education in the twenty-first century and it has abruptly transformed to digital platform during the COVID-19 pandemic situation. Teaching learning process in any bilingual model involves two languages, first language and second language. Further, it promotes full development of two languages, preparing individuals to function in the global society, creates opportunity for early diverse, provide students with future opportunities. Therefore modern technology is very essential part for bilingual education during the current COVID – 19 pandemic situation. In order to facilitate students to learning events, develop basic interpersonal communication skills and academic language proficiency, bilingual teachers as well as students should be professionally competent with modern technology. This study examines effect of modern technology for bilingual students in the Colombo District during the pandemic period.

Keywords

English Language, Bilingual Education, Modern Technology, Proficiency, Pandemic

Introduction

As a global language it is obvious that English Language plays an important role in international interaction. English has proved itself as a torch bearing to the nations of the third world. In the contemporary Sri Lankan society, people try to learn English, mainly because of instrumental motivation more than integrative motivation. Proficiency of English Language has become very essential for Sri Lankan people in order to face challenges in the competitive world. Therefore, bilingual learning enhances cognitive flexibility, strong attentional and executive control and greater metalinguistic awareness. Especially bilingual students study Science and Technology, Mathematics, Information Technology, Physical Education, Citizenship Education and Geography in English medium and other subjects are studied in Sinhala medium.

Bilingual students have English medium text books and teaching and learning process is continued in English medium. Furthermore, bilingual teachers are the most important part in the bilingual teaching process and take their maximum effort to involve and continue the teaching process during the pandemic period. Moreover, bilingual teachers should have good knowledge of English Language and knowledge of new technology. The lack of the basic proficiency in English is another reason for slow development of the bilingual education.

Methodology

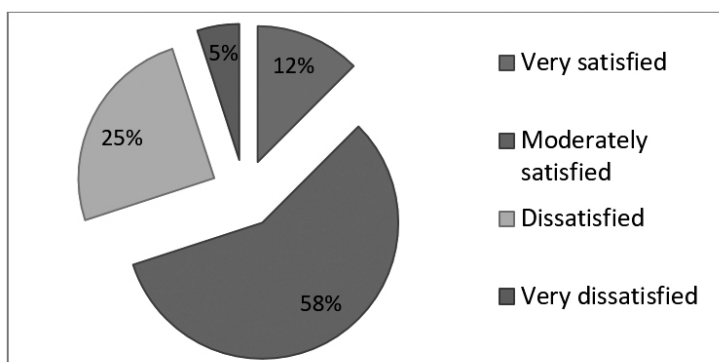
Three schools in Colombo district have been selected for this study and the study is based on several online data collection procedures. The procedures were used in designing

the instrument and collecting the data. Data collection, statistics and explanation of the statistical procedure used to analyze the data. 40 Bilingual students were selected age between 15- 16 and 15 bilingual teachers were selected as the sample of the research. The data collection procedures were online questionnaires for students and teachers and online focus group interview for bilingual education students and selected bilingual teachers. Further, online classes are observed to collect accurate data. Different methods have been presented and analyzed in order to achieve the objectives of the study. The research consists of quantitative and qualitative data. Therefore analysis was conducted accordingly to get the accurate and relevant data.

Results and Discussion

Most of bilingual students had to access online education through smart phones, using mobile data packages while other bilingual students had used their computers and tabs using unlimited internet facilities. There are some students from low-income households suffered disproportionately. Nevertheless, online learning through smartphones limits access for note taking, writing assignments and reading materials while providing laptops and tabs to bilingual students more convenient environment.

The online questionnaire for students has revealed overall satisfaction of online learning using new technology during the pandemic situation. The highest number of bilingual students moderately satisfied while 12% of bilingual students very satisfied about the online teaching and learning process. But 25% of bilingual students are not satisfy about the online teaching and learning process.



Graph 1: Overall analysis on online learning

Most of the bilingual students have mentioned that there are many resources available in the internet and bilingual teachers efficiently use important videos, images for teaching learning process. Therefore, it helps easily understand some difficult concepts, discover new information specially in Science and Technology, Mathematics and Information Technology subjects. Further students have explained that they are well aware with modern technology than the traditional school environment. Further, students stated that, monolingual students do not have that much resources in Sinhala Language for learning process. Furthermore, bilingual students stated that there are some technological issues, signal problems, inability to focus on screen, the feeling of isolation, lack of face to face

communication, teachers tend to focus on theory rather than practice, inaccessible to the computer illiterate students and there are some boring sessions as the disadvantages of the online learning using new technology.

According to the online questionnaire and the group interview of the bilingual teachers, less interaction, technical issues, poor motivation, poor student support, inability to assess writing of the students, not on time attending to the class, not answering the questions verbally and some students can't unmute the microphone as they have very noisy environment with other family members. Nevertheless, bilingual teachers emphasize that they can easily cover the syllabus than the traditional classroom environment, use supreme authentic video clips to explain each and every units, share presentations with peer teaching groups, efficient and use various teaching styles.

Bilingual teachers and students were observed while the online classes. There are some students did not speak any words and some students left the class early. Some teachers use only presentations and did not concern about the interaction of the students. It was noticed that some teachers used the lecture method and there was no any teacher student interaction. After the online lesson some teachers had shared useful videos and audio clips to the WhatsApp group. Most of the students had used Zoom, Microsoft Teams, Google Classroom and Meet.

Conclusion

Bilingual learners and teachers face a number of problems in acquiring their subject related information due to lack of English language proficiency and lack of knowledge and facilities of modern technology. Because, in Sri Lanka, bilingual teachers are trained to expertise in subject teaching approaches and methodologies. But using new technology for learning had consisted less component in their curriculum. In this pandemic situation both bilingual learners and teachers become advance of using new technology for teaching learning process. In this COVID-19 pandemic situation continuous practices and experience helps both learner and teacher to competent enough to use new technology in successful teaching and learning process.

Most of the teachers have mentioned that they need continuous assistance for upgrading knowledge and guidance to use new technology for online teaching in effective way. Moreover, this research illustrates the teachers, who educate the future generation should acquire the above mentioned competency in their teaching process.

References

Cristal, D.(2003), English as a Global Language, 2nd edition. Cambridge, Cambridge University Press.

Jara, M. & Mellar, H. (2007). Exploring the mechanisms for assuring quality of e-learning courses in UK higher education institutions. European Journal of Open and Distance Learning.

Nash, S. S. (2005). Practices for online courses. *Interdisciplinary Journal of Knowledge and Learning Objects* 1, pp.217-228

Reddy, S. (2016), Importance in English Language in today's World, *International Journal of Academic Research*, vol.3, pp 179-183.

Samaraweera, D. (2009), Bilingual Education system showing good results – Education Ministry, *The Sunday Times*, August 30th, p.08

Shen, L and Suwanthep, J.(2011). E-learning Constructive Role Plays for EFL Learners in China's Tertiary Education, *Asian EFL Journal. Professional Teaching Articles*, Vol. 54. Suranaree University of Technology, Thailand

Wijesekara, P. (2011/2012), *Dreams Deferred: English Language Teaching in Sri Lanka*, a journal of Humanistic and Social Sciences, vol.7/8,pp18.

English Language Proficiency of the Bilingual Teachers of Sri Lankan Government Schools in Colombo District

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Abstract

Bilingual Education (BE) has become the cornerstone of education in the twenty-first century. Teaching learning process in any bilingual model of teaching involves two languages, first language and second language. Further, it promotes full development of two languages, preparing individuals to function in the global society, creates opportunity for early diverse, provide students with future opportunities. This study examine whether English Language proficiency of the BE teachers of the Colombo District helps to facilitate BE students in their subject matters. BE teachers facilitate learning events, develop basic interpersonal communication skills and cognitive academic language skills in the learner. The study is based on several data collection procedures. The procedure used in designing the instrument and collecting the data, data collection and statistics and explanation of the statistical procedure used to analyze the data has been described. The data collection procedures were questionnaire and interview for 50 BE students and 20 selected BE teachers and classroom observation. Different methods have been presented and analyzed in order to achieve the objectives of the study. The research consists of quantitative and qualitative data. Therefore analysis was conducted accordingly to get the accurate and relevant data. The data was analyzed using tables and graphs in order to present them in a logical manner. More than 50% of BE teachers have proved that their vocabulary is poor. The majority of BE learners are exposed to wrong formation of letters. Furthermore, majority of BE teachers are not using correct English grammar for accurate communication. 57% of BE teachers make errors when using capitalization and punctuation marks. There are 75% of BE teachers make errors and mistakes in translation. The findings strongly reveal that the various language errors and mistakes are done by the BE teachers of the government schools in Colombo district. Therefore, BE learners face a number of problems in acquiring their subject related information due to the lack of English language proficiency of teachers. Most of the teachers have mentioned that they need continuous assistance for upgrading subject related language knowledge and guidance. Moreover, this research illustrates the teachers, who educate the future generation should acquire the above mentioned competency in their teaching process.

Keywords

English Language, Bilingual Education (BE), Government Schools, Proficiency , Colombo District

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Session 05
Health Sciences

“Impact of covid 19 lockdown on mental health and well being ”

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Abstract

COVID-19 pandemic has caused an immense disturbance in the regular and normal life style of people all around the world. Even though COVID-19 is a health-related pandemic, its alternative results have influenced the peoples' mental health and wellbeing. Therefore, it's a primary need to address the issues based on mental health and wellbeing. The current research was aimed at evaluating the impact of COVID-19 lockdown on mental health and wellbeing. The project targeted the principle psychological concepts and life habits that can influence the mental health. A survey was conducted through online by creating a questionnaire using the Google forms and they were distributed among the people in Colombo and a data set of around 100 volunteers was selected & evaluated. The results obtained from the questionnaire were analyzed using graphical formats. Different types of data are collected to assess the facts that have influenced the most, the conditions which might have resulted and the coping strategies to tackle with the condition of COVID-19 lockdown. Current survey shows that the pressures faced by young people with mental health issues remain dominant. The effect of COVID-19 is likely to be impacted for longer periods of time, considering the enormous economic and social implications of the pandemic. Moreover, current study demonstrated, young people with current needs for mental wellbeing are worried about the ambiguity this creates.

Keywords

covid-19 pandemic, covid-19 lockdown, mental health, psychological concepts

Introduction

Mental health wellbeing is a psychological effectively-being condition in which individuals cope excellently with many of the life pressures, can understand their individual potential, could work productively and can contribute to the community (Kilbourne et al.,2018). As it applies to the foundation of what means to be human, mental wellbeing has tremendous intrinsic value: the manner we communicate, connect, educate and feel sorrow and satisfaction. The capacity of people to exhibit positive behavior which maintains themselves and many others safe and healthy is helped by good mental health. Good mental health often promotes the success of individuals within families, communities and societies in key positions (Ref

Perceptual well-being, perceived self-efficacy, integrity, socioeconomic dependency and appreciation of the capacity to recognize someone else's emotional and intellectual capabilities are principles of mental health wellbeing. It's also been described as a state of well-being in which people understand their skills, are capable of dealing with life's

usual pressures, function effectively in the society, and provide a positive contribution to the community where he/she live in (Galderisi et al., 2015).

Major issues with mental health affect the community as a whole, and not just a small, isolated section. No community is resistant to mental illness, but the vulnerability is higher than the general population among the homeless, the unemployed, potential victims, refugees, immigrants, teenagers, females who have been abused and senior citizens who have been abandoned (Ref). Mental, physical and social wellbeing are tightly interlinked, fundamental elements of life for all individuals (Kilbourne et al., 2018). In the current crisis, younger adults are at increased danger, since most psychological problems grow during this phase of transition. Many young people have already seen the effect on their lives due to this pandemic. During the pandemic, young people who have a history of mental health conditions residing in the country caused their mental health even worse. Considerations over the wellbeing of their families, school and university shutdown, disruption of daily schedule and loss of social interaction were the key causes of loss mental health & wellbeing (Kilbourne et al., 2018)

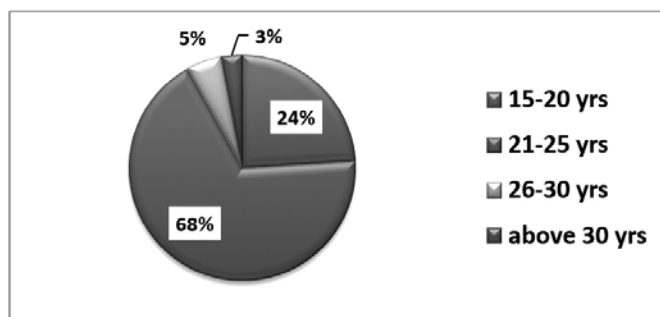
The motive of this study is to scale the association between multiple factors during Covid-19 Lockdown among the general young population in Colombo Sri Lanka. Then the primary objective would rely to monitor and evaluate the psychological, social & personal elements with activities that can influence the mental health & wellbeing of the individuals in Colombo and to detect the coping strategies that are followed based on the awareness

Methodology

The questionnaire for the survey was prepared by focusing on the main facts to be analyzed and the survey questionnaire was distributed through online by using google forms. The questionnaire was composed of totally 16 questions which rely on the project demand, was distributed among 100 individuals.

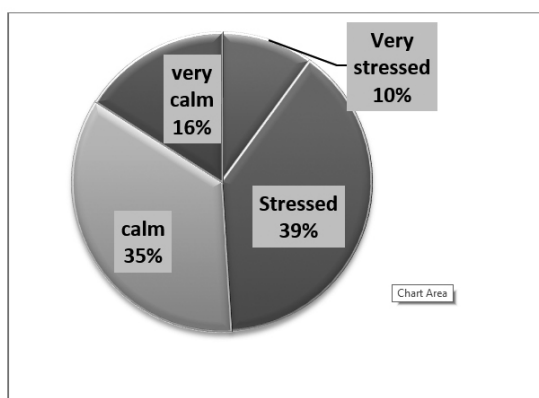
Results and Discussion

The survey was conducted mainly targeting the young population in the Colombo district and the questionnaires were distributed through online. As per the target 100 responses were obtained and during the gender based analysis it was detected that the highest percentage of participants were females which account for around 72% of the total gender population. The categorization based on the age is much more important in a survey to get an overall idea based on the interested age category and maturity level.



Graph 01: Distribution of sample according to the age categories. Out of 100 participants the highest percentage of participants fall in to the category of age 21-25 which account for around 68%. The second highest age category fall under 15-20 year which account for around 24%. Only around 5% of participants have responded from the age category of 26-30 whereas the least percentage was 3% which belong to the age category above 30 years.

As presented in graph 2, it was detected that the highest percentage of people are "stressed" which account for 39% of the total responses. The least percentage of people are belonging to the very stressed category which account for about 10% of total population. It can be clearly observed that around 35% of the responses are "calm" whereas least responses are belonging to very calm category which account for around 16% of the total responses.



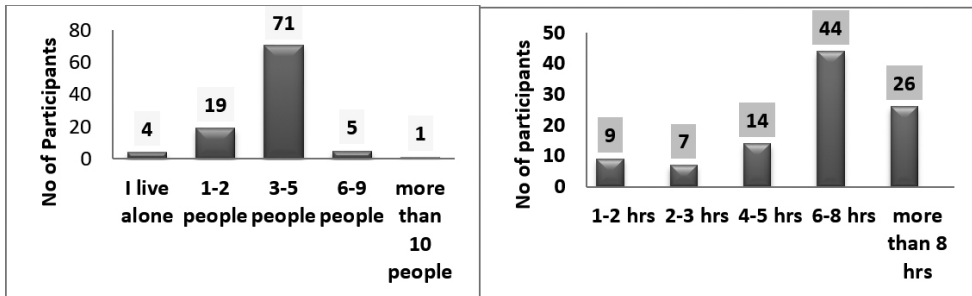
Graph 02 : Analysis based on the stress level during lockdown

The facts which can influence the mental health to become worse are analyzed here and it was detected that academic stress has influenced many people to make their mental health worse and it accounts for about 47% of the total responses. The least concern was detected as the anxiety about COVID-19 and it was recorded as 8% of the total responses. Whereas most of the people have been effected with being bored and it account for around 30%. Not being able to see friends is also a concern among the young adults and recorded as 15% of the responses.

Among the factors which the people miss the most during the COVID 19 lockdown, most of the respondents have missed their friends and it was recorded as 54% out of the complete responses obtained. Respondents have considered nature as the least concern and it was recorded as 12% out of the responses and travelling has accounted for around 34% of the total responses.

It was clearly recorded that around 71% of the people that have responded for the survey live with around 3-5 people at home. Whereas around 19% of the people live with 1-2 people at home. When the analysis is carried it can be clearly understanding that the number of people at home directly influence the mental health and wellbeing. When an individual is surrounded with people such as their parents and family members, they

don't feel that they are isolated and they will be able to share their emotions thus leading to a balanced mental wellbeing during the lockdown and will be able to lead a stress-free life. But it was recorded that around 4% of the total respondents lead a solitary life. When people live alone, they find themselves depressed since they have no people around them to share their emotion and feelings thus it will lead to poor mental health (Steptoe & Fancourt, 2020).



Graph 3 : (a) analysis based on the number of people live with them, (b) analysis based on the number of hours the participant used to stay outside before the COVID pandemic

People were used to spend more time outside their residences, this is due to their busy lives with education, jobs and other works. From the survey it was found that almost 44% of the total respondents used to spend around 6-8 hours per day outside their residence before the lockdown. Whereas 26% of the people from the target population used to spend more than 8 hours. Therefore when the people were locked inside the rooms for 24 hours it is obvious that their mental health would decline. Based on the facts that they miss the most during the lockdown it was recorded as "friends" with a higher percentage of around 54% of the total responses. During the young age people are more closer towards friends than their family due to their life is in the most important process phase of developing social interaction. Whereas around 34% of the respondents have missed travelling which is one of the most vital facts to develop social and mental health (Steptoe & Fancourt, 2020).

Conclusion

Even though the frequency of COVID-19 infection among young people is lesser in Sri Lanka, their situation is particularly vulnerable due to the mental stress they face. The findings of the research showed that the existence and scale of this effect depend on many factors of vulnerability, such as age of maturity, education level, diagnosed mental health condition, factors that they have lost, economically underprivileged & number of people living with them. Containment steps such as long-term closing of schools and universities together expose young people to the debilitating impacts on schooling, psychology, and developmental accomplishment as they encounter isolation, anxiety and confusion. They are put at higher risk by compulsive use of online entertainment and social media.

Although movement restrictions are diminishing, our survey shows that the pressures faced by young people with mental health issues remain dominant. The effect of

COVID-19 is likely to be impacted for longer periods of time, considering the enormous economic and social implications of the pandemic. As our research demonstrates, young people with current needs for mental wellbeing are worried about the ambiguity this creates. Since many young people do not feel comfortable about talking to anyone about their mental health, they can access very confidential and protected counseling services launched during the pandemic by the "National Mental Health Institute" in Sri Lanka. There are some best coping strategies which can be followed to maintain a good mental health & wellbeing during lockdown such as being physically fit (exercise), keep busy (hobbies), stay connected (maintain communication using social apps and etc), entertainment (music & movies), maintain a routine (well structure and plan), manage information (managing media intake & manage social media) & try to stay calm by following meditation/religious activities.

References

Allington,D., Duffy, B., Wessely,S.,Dhavan,N., and Rubin,J., (2020). Health-protective behaviour, social media usage and conspiracy belief during the COVID-19 public health emergency. *Psychological medicine*. 10(1), pp.1-7.

Kilbourne A.M, Beck, K., Brigitta, S.R., Parashar, R., O'Brien,R.W., Tomoyasu,N. and Pincus.A.H, (2018). Measuring and improving the quality of mental health care: a global perspective. *official journal of the World Psychiatric*. 17(1), pp.30-38.

Mendis, N. (2004). Mental health services in Sri Lanka. *bulletin of the Board of International Affairs of the Royal College of Psychiatrists*. 1(3), pp.10-12.

N.Kapasia, P.Paul, A.Roy, J.Saha, A.Zaveri, R.Mallick, B.Barman, P.Das and P.Chouhanc. 2020. Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and youth services review*. 10(1), pp.100-116.

Nguyen,M., Gruber,J., Fuchs,J.,Marler,W.,Hunsaker,A. and Hargittai,E. (2020) . Changes in Digital Communication During the COVID-19 Global Pandemic: Implications for Digital Inequality and Future Research. *journal of Social Media + Society*. 6(3).

Serafini,G., Parmigiani,B., Amerio,A., Aguglia,A., Sher,L., and Amore, M. (2020). The psychological impact of COVID-19 on the mental health in the general population. *QJM: An International Journal of Medicine*. 113(8), pp.531-537.

Shanahan,L., Steinhoff,A.,Bechtiger,L., Murray,L., Nivette,A., Hepp,U., Ribeaud,D. and Eisner, M.(2020). Emotional distress in young adults during the COVID-19 pandemic: evidence of risk and resilience from a longitudinal cohort study. *Psychological medicine*. 1(1), pp.1-10.

Stewart,J., Garrido,S.,Hense,C. and McFerran, K(2019). Music Use for Mood Regulation: Self-Awareness and Conscious Listening Choices in Young People With Tendencies to Depression. *Frontiers in psychology*. 119(10).

Identification of social and occupational risk factors associated with CKDu patients in an agricultural community in Kebithigollewa, Sri Lanka

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Abstract

With the growing prevalence of Chronic Kidney Disease of Unknown etiology (CKDu) in Sri Lanka, this study was done to identify the social and occupational risk factors associated with CKDu patients living in an agricultural community in Kebithigollewa, Sri Lanka. A three months community based cross sectional study was done including 30 CKDu diagnosed patients from CKDu Ayurvedic Clinic at Kebithigollewa, North Central Province (NCP), Sri Lanka and 30 controls were taken from the same region. Socioeconomic and socio-demographic data was collected from the participants with the use of an interview based questionnaire. Heights and weights were measured and the blood samples were collected in order to analyse using an automated blood analyser. Data collected was computerized and analysed using software Graphpad Prism 8 and SPSS version 20. All participants of the research were active residents living in NCP since birth. 83.34% of the CKDu affected individuals were from the 4th to 7th decade of life and 70% of them were males. 86.66% of the affected population carried out agricultural practices as their main source of income with chena and paddy cultivation being the common practice followed. 96.66% of the affected were from low income families who earned 0-20,000 LKR per month. 40% of the affected have had only up to five years of school education. 63.33% of the CKDu patients were overweight. In conclusion, a significant correlation of 0.642218 was shown by Cramer's V square test between the number of working hours/day and serum creatinine indicating a strong association, but did not have a significant nominal logistic regression. Serum creatinine was high in farmers and laborers indicating that occupation impacts on CKDu occurrence and progression. It was also high in age group of 31-50 yrs showing a significant relationship with serum creatinine which indicates the social impact on CKDu occurrence. A statistically significance of $P < 0.05$ was shown by the number of working hours and BMI.

Keywords

Agrochemicals, CKD of Unknown aetiology (CKDu), Heavy metals,

Introduction

Early in the 1990s, an unknown form of chronic kidney disease (CKD) was found in North Central Province (NCP) of Sri Lanka (Ref). Individuals suffering from the disease showed no signs of discomfort or early indicators of having a CKD, hence it was known as chronic kidney disease of unknown aetiology (CKDu). The disease has been prevalent among the paddy farmers of the North Central Province and is beginning to spread to other districts of the country as well. It has become a major health problem in Sri Lanka affecting mostly the socioeconomically poor agricultural communities of NCP (ref). Various hypotheses have been brought up by both local and international researchers for the cause of CKDu. Cadmium and arsenic like heavy metals and agrochemicals like glyphosate that leads to environmental pollution, excessive fluorides coupled with water hardness, Hantavirus and leptospirosis like infections, genetic factors, exposure to toxins of fungi and bacteria, and heat stress are some of those hypotheses (Ruwanpathirana et al., 2019).

According to studies, an approximate of 15-23 % of the reported population in NCP is affected with CKDu and the numbers could be higher since majority of the CKDu cases are identified late in life (ref). Hence, it's important to identify its risk factors, to lower and control the prevalence of new CKDu cases (Pry et al., 2019).

The current research aimed at identifying social and occupational risk factors associated with CKDu patients living in an agricultural community in Kebithigollawa, Sri Lanka. A cross sectional study was carried out to identify how a person's occupation, income, lifestyle and the social behaviors influence the cause and spread of CKDu.

Background

According to the definition by the committee of "National Research Programme for CKDu" launched by the World Health Organization (WHO) in 2008 in cooperation with the "Ministry of Healthcare and Nutrition", Chronic Kidney Disease is said to be of unknown origin if there's no history of past Diabetes Mellitus, severe/ chronic hypertension, glomerulonephritis/ urological diseases, snake bite; <6.5% of normal HBA1C, <160/100mmHg of untreated or <140/90mmHg on antihypertensive medications (up to two). As suggested in previous studies, CKDu aetiology is probably multi-factorial including environmental factors and a vulnerable populations' possible genetic predisposition (Wanigasuriya, 2012). In Sri Lanka CKDu has been found as endemic to some areas such as Kebithigollawa, Padaviya, Nikawewa, Medirigiriya, Medawachchiya, Girandurukotte and Dehiattakandiya in NCP, where people's main source of income and occupation is agriculture. Hence, though the cause(s) of CKDu is yet to be known, it is highly evident and justifiable that chronic exposure and cumulative long-term effects of heavy metal has a predominantly positive role towards the spread of CKDu (Gunatilake, Samarasinghe and Rubasinghe, 2015).

CKDu has been reported from other parts of the world as well including Japan where they named it as "Itai-Itai", Balkan Endemic Nephropathy (BEN) from rural villages that are along Danube River, Mesoamerican Nephropathy (MEN) from Central American countries, India Uddanam Nephropathy, Southern Egypt, Sudan, Veracruz State, Tierra Blanca and Mexico (Gifford et al., 2017; Johnson, Wesseling and Newman, 2019).

Relationship between social and occupational risk factors

The personal life of a person, family, education and work are greatly interconnected to each other that each will inherently influence the other and such these socioeconomic conditions are required in maintenance of a minimum living condition. Hence, the socioeconomic status of a person is best represented by education, occupation and income (Premadasa, Priyanath and Walpita, 2020). For example, lacking of proper education will prevent a person being able to have a job with less labour and high income, leading to poverty and unhealthy life (Kumarasinghe et al., 2019).

Study Purpose

The research is focused on the least studied socioeconomic aspect of CKDu in Sri Lanka (Premadasa, Priyanath and Walpita, 2020) with the main aim to identify the social and occupational risk factors associated with CKDu patients living in an agricultural community in Kebithigollawa, which is a village in the highest CKDu prevalent NCP's Anuradhapura District, Sri Lanka. Since CKDu has become a major health burden of the country, this research would be important in identifying risk factors associated with the disease and would be supportive for the ongoing researches on CKDu.

With the main objective of this study to identify how a person's occupation, income, lifestyle and the social behaviours influence the cause and spread of CKDu, the specific objectives are to make descriptive statistics of the study population; find out associated occupational risk factors with CKDu; find out associated social risk factors with CKDu; identify why CKDu is more prominent in agricultural communities; look the impact of agrochemicals on CKDu; check the effect of BMI on serum creatinine in CKDu patients; see the prevalence of the disease among the family members.

STUDY PROCEDURE

The study was carried out on a monthly basis for three consecutive months at the CKDu Ayurvedic Clinic, Kebithigollewa. Prior to the investigations all participants were detailed regarding the research and their consents were taken for the use and publication of the data. Samples of blood were withdrawn from participants with the help of a phlebotomist and lab technician for analysis of serum creatinine results. The samples were collected using universal guidelines of collection following the protocols stated by the laboratory standards. An interview based questionnaire consisting of both open ended and close ended questions covering participant's age, gender, ethnicity, civil status, duration of stay in North Central Region, information regarding their social lives, behaviours, education and occupations was administered to the participants. The data was collected from affected individuals as cases and unaffected general public of NCP who acted as controls for the study. All the collected data was computed and analyzed.

Results?

Conclusion

The study findings indicate that the serum creatinine levels were high in farmers and laborers indicating that occupation has a significant role in the progression of CKDu in NCP. Number of working hours and BMI show a statistically significant relationship between the two factors with a p value of <0.05 obtained. The preliminary findings of the study indicates the link between occupation and the progression of CKDu. But further

studies are needed to support the finding of this study.

Reference

Gifford, F.J., Gifford, R.M., Eddleston, M. and Dhaun, N. (2017) Endemic Nephropathy Around the World. *Kidney International Reports*, 2(2), pp.282-292.

Gunatilake, S.K., Samaratunga, S.S. and Rubasinghe, R.T. (2015) Chronic Kidney Disease (CKD) in Sri Lanka - Current Research Evidence Justification: A Review. *Sabaragamuwa University Journal*, 13(2), pp.31-58.

Johnson, R.J., Wesseling, C. and Newman, L.S. (2019) Chronic Kidney Disease of Unknown Cause in Agricultural Communities. *The New England Journal of Medicine*, 380(19), pp.1843-1852.

Kumarasinghe, N., Suriyakumara, V., Aslam, F., Hakmanage, N.M., Galgamuwa, L., Abeykoon, I., Lankeshwari, A. and Madushani, R. (2019) Follow up Study on Sri Lankan Traditional Medicine Treatment on Diagnosed Chronic Kidney Disease of Unknown Etiology Patients in Kebithigollewa, North Central Province (NCP), Sri Lanka. *Journal of Kidney*, 5(1), pp.175.

Premadasa, H.K.S., Priyanath, H.M.S. and Walpita, C.N. (2020) The Impact of Social Capital on Socioeconomic Condition of Ckdu Patients in Sri Lanka: An Empirical Investigation. *International Journal of Scientific Research and Management*, 8(05), pp.SH-2020-377-388.

Pry, J., Jackson, W., Rupasinghe, R., Lishanthe, G., Badurdeen, Z., Abeysekara, T., Chandrajith, R., Smith, W. and Wickramasinghe, S. (2019) A pilot study of behavioral, environmental, and occupational risk factors for chronic kidney disease of unknown etiology in Sri Lanka. 10 November

Ruwanpathirana, T., Senanayake, S., Gunawardana, N., Munasinghe, A., Ginige, S., Gamage, D., Amarasekara, J., Lokuketagoda, B., Chulasiri, P., Amunugama, S., Paliawadana, P., Caplin, B. and Pearce, N. (2019) Prevalence and risk factors for impaired kidney function in the district of Anuradhapura, Sri Lanka: a cross-sectional population-representative survey in those at risk of chronic kidney disease of unknown aetiology. *BMC Public Health*, 19(1), pp.763.

Wanigasuriya, K. (2012) Aetiological factors of Chronic Kidney Disease in the North Central Province of Sri Lanka: A review of evidence to-date. *Journal of the College of Community Physicians of Sri Lanka*, 17(1), pp.15-20.

Development of a real time reverse transcriptase PCR assay to detect dengue virus serotype 1

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Abstract

Dengue is an emerging significant health issue worldwide. Dengue virus (DENV) is the causative agent of dengue fever and severe dengue. The prevalence of dengue virus infection is much greater in Asian countries including Sri Lanka. As there is no specific medication discovered yet to treat dengue, it is important to mitigate spread of the disease. Reverse transcription polymerase chain reaction (RT-PCR) assay for dengue diagnosis is a widely available method in current molecular diagnostic field. The present study was conducted to develop Real time RT-PCR protocol for the detection of dengue virus. The implementation of Real time RT-PCR assay has the potential to improve early dengue diagnosis and epidemiologic surveillance of Sri Lanka.

A known DENV-1 positive viral culture sample provided by the laboratory was used for the study. Initially RNA extraction procedure was carried out. Nested RT-PCR assay was performed to verify RNA extraction procedure. Viral RNA was reverse transcribed to generate cDNA. Tenfold and twofold dilution series were performed from synthesized cDNA. Both dilution series were subjected to nested RT-PCR and amplicons were visualized using gel electrophoresis. Two-fold dilution series was subjected to Real time PCR. Results were interpreted using standard and melting curve.

Nested RT-PCR results indicated that DENV-1 was present in the culture sample provided. Gel images of nested RT-PCR for tenfold dilution series were determined to be insensitive. Gel images of nested RT-PCR for twofold dilution series were determined to be sensitive. Real time PCR results revealed that there were no amplification curves observed in amplification plot. Standard curve and melting curve was not obtained as Quantification cycle (Cq) value could not be obtained. Main aim of the current study was not achieved due to degradation of RNA, degradation of chemicals, failure of optimization and validation of the assay. Further Real time PCR assay should be carried out to obtain the expected result.

Keywords

Dengue fever, , RT-PCR, Real time RT-PCR, Nested RT-PCR, Dilution series, standard curve, melting curve

Introduction

Dengue is an infectious mosquito-borne viral disease. There are four distinct dengue virus (DENV) serotypes termed DENV-1 to 4 (Ref). Any of the four serotypes can cause dengue fever where there is a possibility an individual to be infected four times. The incidence of dengue has been increasing dramatically over the last several years. (WHO,2020). According to WHO guidelines issued in 1997, dengue infection was classified into Dengue fever (DF), Dengue hemorrhagic fever (DHF) and Dengue shock syndrome (DSS) (Hadinegoro, 2012). Dengue infection has affected more than 100 countries in the world. About 2.5 billion individuals live in dengue endemic regions (Hasan et al., 2016). Globally 100-400 million human dengue infections occur each year (WHO, 2020). Dengue virus is a single stranded and positive sense RNA virus of the family Flaviviridae, genus Flavivirus. The genome of dengue virus is 10.6 to 11.0 kb in length (Dang et al., 2020).

Diagnosis of dengue virus infection is made on sudden onset of moderately high fever, joint pains, rash and lowered platelet count. Dengue fever is managed by providing supportive care with analgesics, hydration with fluid replacement and sufficient bed rest (Hasan et al., 2016).

Currently there are three basic dengue diagnostic methods used in most of laboratories. These methods are virus isolation/characterization, detection of genomic sequence by nucleic acid amplification assay and detection of dengue virus specific antibodies (Shu and Huang, 2004). Although virus isolation remains the gold standard test for virus detection, recently it has been replaced by RT-PCR method for rapid diagnosis (Shu and Huang, 2004). PCR is a simple process that allows amplification of a specific segment of DNA (Garibyan and Avashia, 2013). Reverse transcriptase (RT) PCR is a simple, inexpensive, highly sensitive PCR technique which determines the expression level of target genes. In this technique RNA molecules are converted to single stranded cDNA by reverse transcriptase enzyme and then amplified by PCR (Tang, Procop and Persing, 1997). Nested PCR enhances the sensitivity of RT-PCR technique (Goode et al., 2002). Real time or quantitative PCR (qPCR) is a modified version of PCR that is currently used in clinical diagnostics and research laboratories. qPCR facilitates quantification of DNA and RNA fragments. This technique is a precise, rapid and sensitive method which is very useful in viral detection (Valones et al., 2009). Due to demand for molecular diagnosis and dengue serotyping Real time RT-PCR (qRT-PCR) assay for dengue diagnosis has been widely used over last five years. The qRT-PCR assay enables sensitive and specific detection of dengue viral RNA (Jusoh and Shueb, 2017).

Due to progressing transmission and enhancing severity of dengue in Sri Lanka, the necessity to develop an accurate and rapid detection method has gained considerable importance. Development of RT-PCR assay will be useful in controlling alarming increase of dengue reported cases in Sri Lanka. qRT-PCR assay is a specific and sensitive method for detection of DENV in acute phase of infection and it has a good diagnostic performance.. Development of qRT-PCR assay will have beneficial effects on early diagnosis of dengue in Sri Lanka.

According to Sirisena and Noordeen (2014) DENV-1 serotype has been identified as a co-circulating serotype which was associated with dengue outbreaks occurred in year

2006, 2009 and 2010 in Sri Lanka. Tissera et al. (2016) demonstrated that DENV-1 and DENV-4 serotypes were responsible for high proportion of febrile illnesses in Colombo. Identification of serotypes is important because if an individual acquired secondary infection with a previously unencountered DENV serotype, it may lead to classical DF and some of the secondary infection cases may develop into DHF which result in DSS and death (Khetarpal and Khanna, 2016).

Serotyping of DENV from human serum specimens is critical for developing control measurements early in the transmission period and for epidemiological investigations of the disease in Sri Lanka. Therefore, this study was carried out to develop a qRT-PCR method for the detection of dengue virus serotype 1.

Methodology

A known DENV-1 positive viral culture sample was provided by the laboratory. Nuclease free water was used as the negative control. Dengue viral RNA extraction was performed based on Silica RNA extraction protocol described by Boom et al. (1990). Dengue consensus primers (D1 and D2) and type specific primer (TS1) were used according to Lanciotti et al. (1992). Nested RT-PCR assay was performed to verify RNA extraction procedure. Agarose gel electrophoresis was performed with both conventional and nested PCR products to determine the presence of DENV-1 RNA. For further optimization of Real time PCR protocol, ten-fold and two-fold dilution series were carried out from synthesized cDNA. Quantification was performed from synthesized cDNA using Nanodrop DNA spectrophotometer to measure cDNA concentration. Ten-fold and two-fold dilution series were subjected to nested RT-PCR and amplicons were visualized using gel electrophoresis. Two-fold dilution series was subjected to Real time PCR.

Results

Nested RT-PCR results indicated that DENV-1 was present in the culture sample provided. Gel images of nested RT-PCR for ten-fold dilution series was determined to be insensitive. Therefore, dilution factor was altered and two-fold dilution series was performed. Gel images of nested RT-PCR for two-fold dilution series was determined to be sensitive. No bands were visualized for negative controls. It indicated that there were no contaminations. Real time PCR results revealed that there were no linearized amplification curves observed in amplification plot. The fluorescence intensity values for original cDNA sample and serially diluted samples remained at the base-line. Hence, standard curve and melting curve was not obtained as Quantification cycle (C_q) value could not be determined.

Discussion

Expected results of the current study could not be achieved and this research suggest that it could be due to degradation or low viral RNA titer, degradation of chemicals, failure of optimization and validation of the assay. Degraded RNA will yield low quality cDNA which may lead to poor qPCR reaction efficiency (Biorad, 2019). During the qPCR assay conventional PCR amplification was not carried out assuming the fact that qPCR is more sensitive than conventional PCR (Gurukumar et al., 2009). Results were expected to be interpreted using both standard and melting curve. As C_q (quantification cycle) and C_T (threshold cycle) values could not be determined from quantification data table, standard curve for DENV-1 could not be plotted. Further modifications of the current qPCR assay

need to be implemented to obtain the expected amplification plot, standard curve and melting curve. Since nested PCR is identified as a highly sensitive technique than qPCR by Sharifdini et al. (2015) and also proved by conventional PCR results of this study it is suggested to carry out nested PCR as qPCR as a solution for low viral RNA titers.

The present study has taken an approach of using SYBR Green based detection system. Although the expected result was not obtained as in the previously published researches, the current study provides reliable results.. Further qPCR assays could not be implemented due to COVID-19 pandemic situation. Application of Taqman probes method on detection of DENV can be evaluated as well.

Conclusion

The specific objective which was to determine sensitivity and specificity could not be achieved due to failure of optimization of the assay. Therefore, this study need to be performed with further modifications. Findings of the current study will be of use for future work regarding DENV-1 detection.

References

- Biorad (2019) 8 TIPS FOR DESIGNING PRIMERS[online]. [Accessed 9 September 2020]. Available at : <https://www.bio-rad.com/webroot/web/pdf/lsr/literature/Bulletin_6894.pdf>.
- Boom, R. Sol, J. A., Salimans, M. M. M., Jansen, C. L., Wertheim-Van Dillen, P. M. E. and Van Der Noordaa, J. (1990) Rapid and Simple Method for Purification of Nucleic Acids. JOURNAL OF CLINICAL MICROBIOLOGY, pp. 495-503.
- Dang, T. T., Pham, M. H., Bui, H. V. and Van Le, D. (2020) 'Whole genome sequencing and genetic variations in several dengue virus type 1 strains from unusual dengue epidemic of 2017 in Vietnam', Virology Journal, 17(1).
- Garibyan, L. and Avashia, N. (2013) 'Polymerase chain reaction', Journal of Investigative Dermatology. Nature Publishing Group, 133(3), pp. 1–4.
- Goode, T., Ho, W. Z., O'Connor, T., Busteed, S., Douglas, S. D., Shanahan, F. and O'Connell, J. (2002) 'Nested RT-PCR. Sensitivity controls are essential to determine the biological significance of detected mRNA.', Methods in molecular biology (Clifton, N.J.), 193, pp. 65–79.
- Gurukumar, K., Priyadarshini, D., Patil, J., Bhagat, A., Singh, A., Shah, P. and Cecilia, D. (2009) 'Development of real time PCR for detection and quantitation of Dengue Viruses', Virology Journal, 6(1), p. 10.
- Hadinegoro, S. R. S. (2012) 'The revised WHO dengue case classification: Does the system need to be modified?', Paediatrics and International Child Health. Maney Publishing, 32(SUPP1), pp. 33–38.

Hasan, S., Jamdar, S. F., Alalowi, M., Al Ageel, A.B. and Sadun, M. (2016) 'Dengue virus: A global human threat: Review of literature', *Journal of International Society of Preventive and Community Dentistry*,6(1), pp. 1–6.

Jusoh, T. N. A. M. and Shueb, R. H. (2017) 'Performance Evaluation of Commercial Dengue Diagnostic Tests for Early Detection of Dengue in Clinical Samples', *Journal of Tropical Medicine*. Hindawi Limited, 2017.

Khetarpal, N. and Khanna, I. (2016) 'Dengue Fever: Causes, Complications, and Vaccine Strategies', *Journal of Immunology Research*, 2016, p. 14.

Lanciotti, R. S., Calisher, C. H., Gubler, D. J., Chang, G. J. and Vorndam, A. V. (1992) 'Rapid detection and typing of dengue viruses from clinical samples by using reverse transcriptase-polymerase chain reaction', *Journal of Clinical Microbiology*,30(3), pp. 545–551.

Sharifdini, M., Mirhendi, H., Ashrafi, K., Hosseini, M., Mohebbali, M., Khodadadi, H. and Kia, E. B. (2015) 'Comparison of nested polymerase chain reaction and real-time polymerase chain reaction with parasitological methods for detection of *Strongyloides stercoralis* in human fecal samples', *American Journal of Tropical Medicine and Hygiene*,93(6), pp. 1285–1291.

Shu, P. Y. and Huang, J. H. (2004) 'Current advances in dengue diagnosis', *Clinical and Diagnostic Laboratory Immunology*, 11(4), pp. 642–650.

Sirisena, P. D. N. N. and Noordeen, F. (2014) 'Evolution of dengue in Sri Lanka- changes in the virus, vector, and climate', *International Journal of Infectious Diseases*,19(1), pp. 6–12.

Tang, Y. W., Procop, G. W. and Persing, D. H. (1997) 'Molecular diagnostics of infectious diseases', *Clinical Chemistry*, 43(1), pp. 2021–2038.

Tissera, H., Amarasinghe, A., Gunasena, S., DeSilva, A. D., Yee, L.W., Sessions, O., Muthukuda, C., Palihawadana, P., Lohr, W. and Byass, P. (2016) 'Laboratory-Enhanced Dengue Sentinel Surveillance in Colombo District, Sri Lanka: 2012-2014', *PLOS Neglected Tropical Diseases*, 10(2), p. e0004477.

Valones, M. A. A., Guimarães, R. L., Brandão, L. A. C., De Souza, P. R. E., De Albuquerque Tavares Carvalho, A. and Crovela, S. (2009) 'Principles and applications of polymerase chain reaction in medical diagnostic fields: A review', *Brazilian Journal of Microbiology*, 40(1), pp. 1–11.

World Health Organization (2020) Dengue and severe dengue [online]. [Accessed 3 January 2020]. Available at:< <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue> >.

Development of real-time PCR assay to detect bk virus

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Abstract

BK virus is often seen as a complication in patients with renal transplantation as immune system is weakened. It is seen in immunocompromised or immunosuppressed people too. Even though, primary infection occurs in early childhood, the reactivation of BK virus occurs in adulthood. Different studies like; cytological and histological studies are done to detect the virus along with other molecular tests. Molecular tests like PCR and RT-PCR can be carried out to detect BK viral quantity. The patient requires early diagnosis with specific and sensitive results to guide on proper management and treatment in a patient. Hence, this study aimed to Develop Real-Time PCR assay to detect and quantify BK virus.

The two main steps involved were Conventional Polymerase Chain Reaction (PCR) and quantitative Real-Time PCR (RT-qPCR). The conventional PCR was adapted from a previous study and the real-time PCR was developed by this study. The minimum detection levels of both assays were determined. Standard templates were prepared using BK Virus positive control material. The adapted conventional PCR assay was validated and the minimum detection level was 1,600copies/reaction of BK Viral DNA. The minimum detection level of the real time PCR assay was 320copies/reaction of BK Viral DNA. The r² value obtained for the standard curve in this study was 0.295. There was a large percentage error in the quantification of the standard templates.

The study shows that the minimum detection level of BK Virus can be reduced by five time that of conventional PCR when using real time PCR. Many improvements must be made to the assay before it can be used to reliably quantify BK virus in clinical samples.

Keywords

BK Virus, Real-time PCR, Conventional PCR, Viral load, Viral Quantification

Introduction

Human polyomavirus 1 (BK Virus) previously known as BK Polyomavirus and BK Virus that belongs to Polyomaviridae family. Initially, BK Virus was identified from urine sample in a patient with renal transplantation in 1971. The term "BK" was derived from the patient's initials, thus it was named as BK Virus (Ambalathingal et al., 2017). Different species like; BK Virus, JC Virus and Simian Virus 40 (SV-40) make up the subgroup

of Papovaviruses. These Polyomaviruses tend to cause various conditions/disease in humans, where humans act as the natural host for these organisms (Bohl and Brennan, 2007).

The main route of BK Viral transmission occurs via respiratory route, sexual activity and transplacental passage. Respiratory route is considered as the most common and likely route of transmission (Reploeg, Storch and Clifford, 2001).

In order to cause the disease and to infect a cell, the genome of the BK Virus must be carried into the nucleus of a cell. Initially, this occurs by BK Virus attaching to the surface of the host cell. This attachment occurs when structural protein VP1 attaches to the cell receptors. This attachment or the interaction between BK Virus and the target cell is maintained by polysialylated gangliosides, where gangliosides play a vital role in the initial interaction or attachment. Thus, ganglioside receptors such as GD1 and GT1 attach the structural protein VP1. Initial step of attachment is then followed by internalization, the virus enter the target cell via the formation of caveola. The virus is then moved in to the cytoplasm with the help of microtubules presented (Ambalathingal et al., 2017). This is then followed by trafficking through the Endoplasmic Reticulum. Two important observations, such as isomerization of disulphide bonds and cleavage of VP1 proteins are made during trafficking. In other words, disassembling of VP1 proteins take place. The genome of BK Virus in cytosol has to be moved/transported into the nucleus of the host cell before viral replication occurs (Helle et al., 2017).

BK Virus is often identified as a complication in patients with renal transplantation and observed in immunocompromised or immunosuppressed patients. Primary infection with BK Virus occurs during childhood and remains latent in various parts of the body. Although, the primary infection shows no signs and symptoms, a mild fever and non-specific upper respiratory infections may be observed. Even though, the organism is observed mostly in the kidneys, it may still remain in other parts like; lungs, eyes, liver and brain (Bohl and Brennan, 2007). Reactivation of BK Virus occurs during a state of immunodeficiency or immunosuppression, where this is highly notable during renal or hematopoietic stem cell transplantation in a patient. Either a donor or the recipient may contribute to the reactivation of BK Virus during a renal transplantation (Reploeg, Storch and Clifford, 2001). In addition, various health conditions like, cancer, diabetes, HIV infection, pregnancy and transplantation may cause BK Viral Viruria. This reactivation of BK Virus results in various complications such as; BK Virus-associated nephropathy (BKVAN), hemorrhagic and non-hemorrhagic cystitis, ureteric stenosis and nephritis, while pneumonitis is caused when BK Virus is associated with lungs and a complication with eyes and brain results in Atypical retinitis and Meningoencephalitis respectively (Ambalathingal et al., 2017).

Diagnostic Techniques

BK Virus can be diagnosed by different techniques, where the method involved is dependent on replication stage. There are three different detectable stages observed after replication of BK Virus. The stages include; Viruria, Viremia and Nephropathy. Normally, techniques like cytological studies, microscopy studies, histological studies can be performed along with Enzyme-linked immunoabsorbent assay for antigens and molecular testing to detect the Deoxyribonucleic acid (DNA) of BK Virus. A Cytological

study along with microscopy study often leads to an identification of virus infected cells known as “decoy cells” and “viral particles” respectively (Bohl and Brennan,2007). This type of diagnosis is made during the stage of viruria as BK Viral infections are active during this stage, thus makes it a sensitive test, even though it lacks specificity. Morphological appearance is used as a feature to differentiate between the normal and infected cells from the urine sample. The stage ‘Viruria’ can also be diagnosed via molecular test like PCR. This basically indicates better sensitivity and specificity compared to cytological findings (Bechert et al.,2010).

Although, there are various tests performed in the identification of BK Virus, a renal biopsy remains the gold standard test (Bohl and Brennan,2007). Although a positive result from renal biopsy remains the gold standard test during the diagnosis of BK Viral nephropathy, it may still lead to false-negative results. This false-negative results may occur due to any sampling errors during the biopsy study. This kind of circumstances generally promote the use of molecular diagnostic techniques. The availability of different diagnosis methods like cytological and histopathological studies consist of both advantages and disadvantages however, the use of molecular diagnostic method remains constant. There are various types of molecular tests that are involved in identifying the DNA of BK Virus. This mainly include; Conventional Polymerase Chain Reaction (PCR) and Real-Time PCR (RT-PCR) (Bechert et al.,2010).

RT-PCR is of two types: Qualitative RT- PCR and Quantitative RT-PCR(qRT-PCR). In diagnosis of BK Virus, Quantitative Real-Time PCR(RT-qPCR) is used. This is involved with quantification/measurement of viral load that is presented in the given sample (Bechert et al.,2010). This method depends on the BK specific sequence amplification. In addition, the final results depends on the amplification and standard curves produced. RT-PCR in the diagnosis of BK Virus plays a major role due to its specificity and sensitivity along with reproducibility and reliability. The test even has the tendency to replace renal biopsy studies, because of its high positive predictive value (which is about 98%) that is indicated in the assay. The test consists of benefits like rapid turnaround time, decreased hands on time and chance of contamination is less compared to conventional PCR as performed in a homogenous (closed) system (Bateman et al.,2016).

The amplification takes place during a Real-Time PCR assay. This involves 03 basic steps known as: Denaturation, Annealing and Extension. Denaturation is involved with the separation of double stranded DNA into single strands by heating at a temperature of 94°C to 95°C. During Annealing, the oligo nucleotides primers attach to the Complementary DNA strands and begin polymerization. The temperature for this step must be chosen carefully as it must be lower when compared to the melting temperature of the primers used. Extension is when strands get extended in the 3’ to 5’ direction. In addition, the SYBR Green added is a dye which fluoresces when binds to the double stranded DNA. The amount of fluorescence presented in the sample is detected during Real-Time PCR. This is then plotted against the cycle number (Lorenz, 2012). The main aim of this Research is to Develop Real - Time PCR assay to detect and quantify Human Polyomavirus 1 (BK Virus).

Methodology

BK Virus positive control material amplified using the LT1/LT3 primer pair was provided

by the laboratory. Distilled water (D.W) was used as the no template control. The primers used in this study were developed by Authur, Dagostin and Shah (1989) and Nickelleit et al. (1999). The specificity and the amplicon sizes were verified using Primer BLAST. In addition to the above-mentioned materials, there were also other materials and chemicals that were used during different stages of the methodology. A Conventional PCR assay was optimized in a previous study at GENETECH Molecular Diagnostics based on the work of a paper produced by Nickelleit et al. (1999). This method was validated and adapted in this study.

Amplified BK Virus (+) DNA using the BKV LT1 and BKV LT3 primer pair was provided by the laboratory. This was separated using Agarose Gel Electrophoresis (AGE) for 60 minutes at 100V with ethidium bromide staining. The separated DNA amplicon was purified using a kit known as PureLink™ PCR Purification Kit, from Thermo Scientific, Waltham, Massachusetts, US. The resulting extract was quantified using a Nanodrop spectrophotometer and was diluted to standard concentrations before being used as a positive control. The serial dilutions were aliquoted from an original of 40,000copies/μL into 8,000copies/μL, 1,600copies/μL, 320copies/μL, 64copies/μL, 12.8copies/μL, 2.56copies/μL and 0.512copies/μL to be used in this study. The molecular weight of the amplified sequence was determined using the standard reference sequence (Accession number NC_001538.1).

The purified template along with its dilutions previously prepared was used to simultaneously validate the assay and to determine its minimum detection level. During the preparation of master mixture, 10μL of D.W and 5μL of the template was added per reaction in addition to other reagents (Green GoTaq flexi Buffer, MgCl₂, dNTPs Mixture, forward and backward primers and Taq polymerase Enzyme).

Polymerase Chain Reaction takes place after the preparation of master mixture. Basically, 3 main phases are performed in a thermo cycle profile. This include initial denaturation at a temperature of 94°C for 2mins, which is then followed by denaturation for 30s, annealing at 50°C for 45s and extension at 72°C for 60s. Finally further extension takes place at 72°C for 5mins. These particular phases were set for 30cycles and final product was stored at the temperature of +4°C.

2% Gel Electrophoresis was conducted to visualize the bands presented and to observe amplification. 0.5X Tris Borate EDTA (TBE) PH 8.0 buffer was used for the purpose. Ethidium Bromide was added to the buffer and DNA was separated at 100V for 60 minutes. Images were captured using the E-gel imager gel documentation system. Real-Time PCR was performed using the 2 X RT² SYBR Green system along with other reagent concentrations such as BKV LT1, BKV LT3 and Template. The templates and the thermo-cycle profile were the same as described for the Conventional PCR assay.

Results

The gel image for the optimization of conventional PCR with BK Viral samples indicate amplification on the first three samples for BK virus with the copy number of 40,000copies/reaction, 8,000copies/reaction and 1,600copies/reaction, while others indicate weak amplification including the negative control in lane 9.

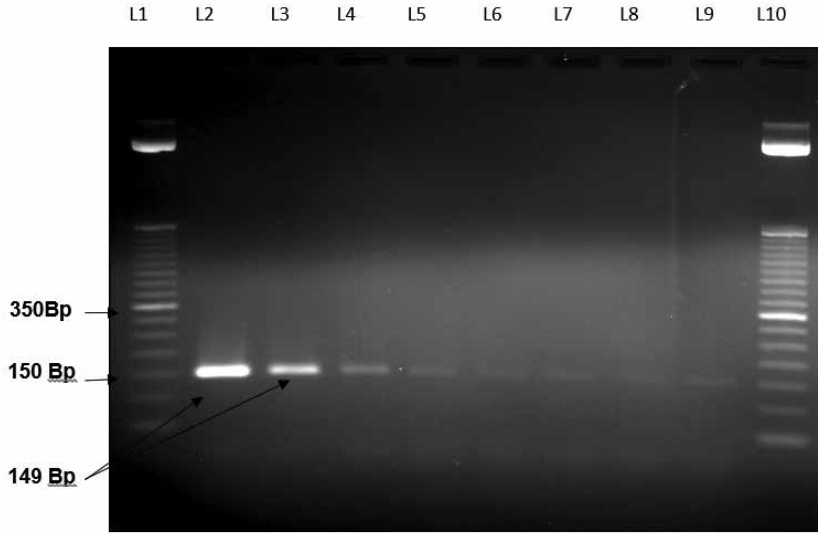


Figure 01: The gel image for optimization of conventional PCR done on BK Viral samples with a Negative Control. From Left; Lane 1- 50Bp DNA Ladder, Lane 2 to Lane 8 – contains amplicons with concentration 40,000copies/reaction, 8,000copies/reaction, 1,600copies/reaction, 320copies/reaction, 64copies/reaction, 12.8copies/reaction and 2.56cpies/reaction respectively, Lane 9- Negative Control and Lane 10- 50Bp DNA Ladder.

The conventional PCR assay was repeated after de-contaminating the entire laboratory with additional Negative controls to find the source of contamination. The amplicon is visible up to Lane 4 which contains the sample with 1,600copies. All negative controls are clear and no other amplicons are seen.

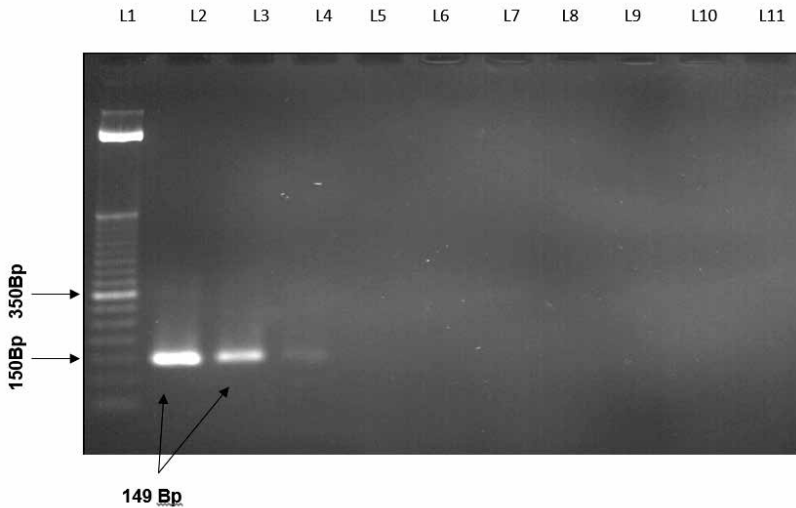


Figure 02: The gel image obtained when the above step was repeated to find the source of contamination. From Left; Lane 1- 50 Bp DNA Ladder, Lane 2 to Lane 8 – contains amplicons with concentrations 40,000copies/reaction, 8,000 copies/reaction, 1,600copies/reaction, 320copies/reaction, 64copies/reaction, 12.8copies/reaction and 2.56copies/reaction respectively, Lane 9 and 10 - Negative Controls and Lane 11 - Negative control containing No Taq Polymerase Enzyme.

Four amplification curves, which corresponds to the higher concentration of DNA presented in samples tested. The higher concentrations were with the copy number of 40,000, 8,000, 1,600 and 320copies/reaction. Standard curve was generated by the software based on the amplification. Deviation could be observed in the Cq value of the samples containing 320copies/reaction. All other samples correlate with the standard curve. The coefficient of determination (r^2) was 0.295. Melting peaks are visible at 77°C in the four samples where amplification was detected. No non-specific peaks are detected.

Discussion

The aim of this particular Research was to develop Real-Time PCR Assay to detect BK Virus and to run a conventional PCR to validate and determine the minimum detection level of BK Virus. The amplifications were observed in the first three samples and weak amplification was observed in the others including the negative control thus indicates slight level of contamination leading to the repetition of the method carried out to find the source of contamination.

After decontamination of the working space, the conventional PCR was repeated along with three Negative controls. The controls were D.W collected from pre-PCR and DNA Extraction areas along with a control with no Taq Polymerase Enzyme. The negative control without the enzyme was used to ensure that the amplicon observed is not the template appearing as a false amplicon. According to the repeated procedure, 3 amplification bands were observed with clear negative controls. Therefore the Conventional PCR assay was validated and the minimum detection level of BK Virus was determined to be 1,600copies/reaction of BK Virus.

The RT² SYBR Green ROX qPCR system was used to carry out the Real-Time PCR assay. As seen in the amplification curve, there was amplification at 320copies/reaction of BK virus indicating that the minimum detection level of the Real-Time assay is five times that of the conventional PCR assay performed.

The standard curve illustrates the quantification of BK Viral load presented. As seen, the Cq value calculated for the third sample (containing 1,600copies/reaction) is an outlier. The calculated r^2 was 0.295 indicating there was no linear correlation between the Cq and starting quantities. Therefore further work is needed in order to optimize the quantification of the virus. The melting peak curves confirm the presence of an amplicon with a Tm of 77°C and no other amplicons were detected.

A study by Lee et al.,(2010) on comparing between the detecting methods of BK Virus infection in patients with renal allograft recipients demonstrates a test carried with different detecting methods like; cytological studies, RT-PCR(for both urine and blood sample)

and histological study. Sensitivity of real-time PCR for both type of samples were 100% while specificity was 69% for urine and 94.5% for blood sample. This concludes RT-PCR as a useful and early diagnosis to screen for BK Virus.

Pinto et al., (2018) carried out a research on quantitative detection of BK Virus in kidney transplant recipients: a prospective validation study. This research depicts a marked variability among the viral loads of BK Virus when different qRT-PCR was performed. It also shows in-house qPCR as useful and cheap when compared with the usage of qPCR kits. The study indicates an urgent need for the BK Virus standard in the International community.

There are various limitations that can affect the results produced by Conventional or Real-Time PCR methods. False positive results may be produced due to carry-over contaminations from a different PCR reaction. This results in the formation of undesired products during Gel Electrophoresis. To prevent such circumstances, positive and negative controls can be added (Lorenz, 2012). This complication was minimized during the study as D.W contained Negative control was added during Gel Electrophoresis. Handling of Ethidium Bromide must be given a complete care as it is a very dangerous chemical. Any spillage must completely be removed and cleaned immediately (Lorenz, 2012). It was handled with complete care as use of safety equipments like gloves, lab coat and masks were involved. The chance of contamination is high in PCR as proper handling and maintenance is required. Non – specific amplification might occur due to any variations in primers (Garibyan and Avashia, 2013).

Even though Conventional PCR develops limitations as mentioned above, RT-PCR plays a vital role in fulfilling the requirements of clinicians. RT-PCR is of two types known as Qualitative and Quantitative, in which quantitative RT-PCR was performed in the detection of BK Virus as it is capable of quantifying the viral load presented in the sample. It is a rapid, cost – effective test with high accuracy and reliability. The sensitivity and specificity of the test is very high making it an effective test in the identification of BK Virus. This as a diagnostic technique provides information at the best possible way ensuring a good monitoring and therapeutic level to follow proper management. In addition, no Gel Electrophoresis needs to be done, no handling of Ethidium Bromide stain and other chemical involved. Chance of contamination is less as performed in a closed system compared to conventional PCR. Overall, one specific requirement is that scientists must be specialized to operate RT-PCR machine (Melnik et al., 2015).

Quantitative RT-PCR is an important diagnostic method in monitoring the viral load presented in immunocompromised or immunosuppressed patients, especially in patients with BKVN. But, lack of standardized reference material and variability among laboratories make it difficult in interpreting the results. Rennert et al. (2015) mentioned a linear correlation in a study conducted on the Development of a BK Virus Real-Time Quantitative Assay using the bioMerieux Analyte-Specific Reagents in Plasma Specimens. This confirms a high precision rate. Nevertheless the confirmations obtained on various detected results, the cutoff levels of BK Virus viremia and prediction of BKVAN is still not estimated thus varies with laboratories leaving it to be under investigation. The study shows no cross-reactivity between organisms, but shows high sensitivity and specificity in detection (Rennert et al., 2015)

Still, RT-PCR as a molecular test plays a vital role in the detection of BK Virus. Even though it deals with number of limitations, it still remains the best test as it is performed in a high secured environment that is free from contamination. The test produces results that are sensitive and specific with reliability and reproducibility. This ensures for a better treatment and management in a patient.

The aim of this study was to develop a RT-qPCR assay for BK Viral quantification. Although a reliable method of amplifying BK Virus using RT-PCR was developed in this study more work must be carried out in order to accurately quantify the viral load in a given clinical specimen. The first limitation in this study was in quantifying the template. The percentage error estimated for the standard templates prepared in this study was approximately 30%. A more accurate method of determining small quantities of DNA (<10ng/μL) would increase the reliability of results obtained.

The coefficient of determination for the standard curve generated in this study showed no linear correlation between the Cq and starting quantities. Better quantification of the templates may result in a higher correlation between these two variables, leading to more accurate results. As per the results of Guescini et al. (2008) the use of clinical samples may lead to slightly less amplification compared to positive control material. Human samples must therefore be used in the optimization of the quantification assay for BK Virus in order to account for this error.

Conclusion

Real-Time Polymerase Chain Reaction (RT-PCR) plays an immense role in identifying BK Virus as it is capable of quantifying the viral load that is presented in the sample provided. This study concludes that the RT-PCR developed in this study is a more reliable method of detecting BK Virus compared to conventional PCR due to it having a lower minimum detection level, however more work must be done before this assay can be used as a quantitative assay.

References

- Ambalathingal, G.R., Francis, R.S., Smyth, M.J., Smith, C. and Khanna, R. (2017) BK Polyomavirus: Clinical Aspects, Immune Regulation, and Emerging Therapies. *Clinical Microbiology Reviews*, 30(2), pp.503-528.
- Aurthur, R.R., Dagostin, S., Shah, K.V. (1989) Detection of BK virus and JC virus in urine and brain tissue by the polymerase chain reaction. *Journal of Clinical Microbiology*, 27(6), pp.1174-1179.
- Bateman, A.C., Greninger, A.L., Atienza, E.E., Limaye, A.P., Jerome, K.R. and Cook, J. (2017) Quantification of BK Virus Standards by Quantitative Real-Time PCR and Droplet Digital PCR Is Confounded by Multiple Virus Populations in the WHO BKV International Standard. *Clinical Chemistry*, 63(3), pp.761-769.
- Bechert, C.J., Schnadig, V.J., Payne, D.A. and Dong, J. (2010) Monitoring of BK Viral Load in Renal Allograft Recipients by Real-Time PCR Assays. *American Journal of Clinical Pathology*, 133, pp.242-250.

Bohl, D.L. and Brennan, D.C. (2007) BK Virus Nephropathy and Kidney Transplantation. *American Society of Nephrology*, 2, pp.36-46.

Garibyan, L. and Avashia, N. (2013) Research Techniques Made Simple: Polymerase Chain Reaction (PCR). *The Journal of Investigative Dermatology*, 133(3), pp.1- 4.

Helle,F.,Brochot,E.,Handala.L.,Martin,E.,Castelain,S.,Francois,C. and Duverlie,G. (2017) Biology of the BKPyV: An Update. *Viruses*,9(27),pp.1-18.

Lee,S.H.,Park,Y.J.,Yang,C.W.,Kim,Y.S.,Moon,I.S.,Kang,C.S. and Choi.,Y.J.(2010) Comparison of Detecting Methods of BK Virus Infection in Patients with Renal Allograft Recipients. *The Korean Journal of Pathology*, 44, pp.636-641.

Lorenz, T.C. (2012) Polymerase Chain Reaction: Basic Protocol Plus Troubleshooting and Optimization Strategies. *Journal of Visualized Experiments*, (63), pp.3998.

Melnyk, J.E., Rodriguez, P.L., Peraud, O. and Hein, R.C. (2015) Clinical Applications of Quantitative Real-Time PCR in Virology. *Current and Emerging Technologies for the Diagnosis of Microbial Infections*, 42, pp.161-197.

Nickeleit,V.,Hirsch,H.H.,Binet,I.F.,Gudat,F.,Prince,O.,Dalquen,P.,Thiel,G.and Mihatsch,M.J.(1999) Polyomavirus Infection of Renal Allograft Recipients. *Journal of the American Society of Nephrology*, 10(5), pp.1080-1089.

G.,Poloni,J.A.T.,Paskulin,D.A.,Spuldara,F.,Paris,F.D.,Barth,A.L.,Manfro,R.C.,Keitel,E. and Pasqualotto,A.C.(2018) Quantitative detection of BK Virus in kidney transplant recipients: a prospective validation study. *Brazilian Journal of Nephrology*, 40(1), pp.59-65.

Rennert, H., Fernandes, H., Gilani, Z. And Siple, J. (2015) Development of a BK Virus Real-Time Quantitative Assay using the bioMerieux Analyte-Specific Reagents in Plasma Specimens. *American Journal of Clinical Pathology*, 144(6), pp.909-915.

Potential for foodborne transmission of respiratory syndrome coronavirus 2 (sars-cov-2): a mini review

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Abstract

Viruses are among the leading infectious agents, as they require a host to complete their life cycle. Most recently, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for infecting the respiratory system of humans, was reported. As the disease spread quickly over the continents, the World Health Organization declared the coronavirus disease 2019 (COVID-19) as a pandemic in March, 2020. Although human to human transmission is identified as the main mechanism of transmission, since the first cases of this disease were linked to a seafood market, it was presumed to have animal to human transmission. As a result, concerns have been raised if SARS-CoV-2 could spread through foodborne routes. Angiotensin converting enzyme 2 (ACE2) are proteins that serve as receptors for coronaviruses including SARS-CoV-2. These proteins are attached to the cell membranes of cells located in the lung, arteries, heart, kidney, and intestine. As intestinal epithelial cells express a high concentration of ACE2 receptors, SARS-CoV-2 is most likely to be present in the gastrointestinal tract, once it enters the human body. Although, the primary transmission route for human infection with SARS-CoV-2 is via respiratory droplets, SARS-CoV-2 could transmit through fecal-oral route as various studies have reported gastrointestinal symptoms in patients. This could pose a threat to public health as food commodities such as fresh produce and dairy products, could get contaminated while handling. However, no published studies of SARS-CoV-2 survival in or on food products were located. The situation in which a food handler is found to be positive would need to be assessed, as the studies have shown the ability of SARS-CoV-2 to persist on the inanimate surfaces. It could be possible that virus could transmit through food contact surfaces and food packages due to their ability to survive on these surfaces. Therefore, following general guidelines for managing infectious diseases and practicing good manufacturing practices in the food processing plants and by food handlers could reduce the risk of infecting the general public through foodborne routes.

Keywords

SARS-CoV-2, foodborne-transmission, public health, food safety

Introduction

Emergence and reemergence of infectious diseases is a considerable global concern for public health. Viruses are among the leading infectious agents as they require a host cell to make more copies of themselves. Also, due to error prone replication of their genetic material, they are known to mutate quickly. In the last twenty years, several viral epidemics have been recorded. Most recently, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for infecting the respiratory system of humans was reported (Wang et al., 2020). The World Health Organization (WHO) announced this disease as coronavirus disease 2019 (COVID-19). By the end of September, 2020,

the disease was spread to more than 200 countries causing >35 million confirmed cases and >1 million deaths. Although human to human transmission is identified as the main mechanism of transmission, since the first cases of this disease were linked to a seafood market, it was presumed to have animal to human transmission. As a result, concerns have been raised if SARS-CoV-2 could spread through foodborne routes. However, to date, aspects such as origin, transmission and pathophysiology of this virus is not fully understood.

Background

Coronaviruses belonging to Coronaviridae family are non-segmented, positive sense, single stranded RNA viruses covered by an envelope (van der Hoek et al., 2004). Coronaviruses are known to have the largest RNA virus genome of 26-32 kilobases (Su et al., 2016). The name, Corona was given due to their crownlike appearance. Coronaviruses are known to cause respiratory, hepatic, gastrointestinal and neurological diseases in humans, livestock, bats, birds and other animals (Holmes and Lai, 1996). According to the sequence analysis, it has shown that genome structure of SARS-CoV-2 is similar to bat SARS like coronaviruses belonging to betacoronavirus (Chen et al., 2020). First patient infected by this novel virus was identified in late December, 2019 in Wuhan, China. The unknown causative agent was reported to be epidemiologically linked to a seafood wholesale market in Wuhan, China. The Chinese Center for Disease Control and Prevention (China CDC) started epidemiologic and etiologic investigation. Next generation sequencing methods were used to identify the pathogen from the samples taken from the lower respiratory tract of patients. The pathogen was identified as a novel enveloped RNA betacoronavirus, SARS-CoV-2 (Lu et al., 2020). The SARS-CoV-2 was found to cause severe respiratory illness similar to SARS-CoV (Huang et al., 2020). Based on the early outbreak data, SARS-CoV-2 showed an exponential growth with a mean basic reproduction number (R_0) that ranged from 2.24-3.58 (Zhao et al., 2020). The incubation time of this virus ranged from 3 days to 2 weeks. Outer surface of the cells in lungs, heart, kidney, arteries and intestine of humans have Angiotensin converting enzyme 2 (ACE2) that serve as receptors for coronaviruses including SARS-CoV-2 (Zhou et al., 2020). As a result, SARS-CoV-2 mainly infects respiratory tract. Huang et al (Huang et al., 2020) reported in their study that the symptoms caused by this pathogen include fever, dry cough, and malaise, are non-specific. In the early studies, only a few cases were reported with vomiting or diarrhea. However, recent studies have suggest the gastrointestinal symptoms shown by patients should be up to 76% (Tian et al., 2020).

Relevance

Implication of food as a vector for the novel SARS-CoV-2 has been a concern as many aspects of this virus are still not fully understood. Because it is a new virus, and humans are not known to have an immunity against the infection, general assumption is that everyone is susceptible. Since the first reported cases were linked to a seafood market in Wuhan, China, animal to human transmission of SARS-CoV-2 was presumed as the main mechanism. However, the subsequent cases were not exposed to the aforementioned situation, and it was concluded that the virus can also be transmitted from person to person. Phylogenic characterization shows that SARS-CoV-2 is closely related to the corona virus found in bats. However, as bats were not sold in the Wuhan seafood market during that time, it is thought that an intermediate host is responsible for

transmitting the virus from bats to humans (Lu et al., 2020). However, to date, the mode of initial transmission of this virus to humans is unknown.

Coronaviruses generally spread from human to human through respiratory droplets generated during coughing or sneezing (Guan et al., 2020). However, SARS-CoV-2 could transmit through fecal-oral route as various studies have reported gastrointestinal symptoms in patients. The RNA of the SARS-CoV-2 have been isolated from the fecal samples of the patients (Wölfel et al., 2020, Wu et al., 2020). As intestinal epithelial cells also express high concentration of ACE2 receptors, virus is most likely to be present in the gastrointestinal (GI) tract once it enters the body (Wong et al., 2020). Another study show that 17 patients showed positive results with their stool samples, but negative results with respiratory samples (Xiao et al., 2020). This implicates its ability to actively infect and replicate in GI tract. However, another study showed that they were unable to grow SARS-CoV-2 viruses isolated from fecal samples of patients in cultured cells (Wölfel et al., 2020). Live virus present in fecal samples could be also due to swallowing mucous of upper respiratory during early stages of the infection.

Another concern is that, coronaviruses are known to persist on inanimate surfaces (Otter et al., 2016). Understanding their ability to persist on surfaces and means of disinfection is important to prevent the contamination of food, food packages and food contact surfaces by this virus. Coronaviruses are known to persist on steel, aluminum, metal, wood, paper, glass, plastic, PVC, silicon rubber, surgical gloves, disposable gowns, ceramic and teflon (Kampf et al., 2020). The SARS-CoV-2 is known to persist longer in stainless steel and plastic surfaces compared to copper and cardboard surfaces (van Doremalen et al., 2020). According to the data of the same study, the half-lives ranged from 0.77-6.81 hours. Data support that transmission of SARS-CoV-2 could occur from inanimate surfaces. The SARS-CoV-2 could also remain infectious in aerosols (van Doremalen et al., 2020). Temperature is known to affect the persistence of MERS-CoV. It could survive at 20-C for 48 h and 30-C for 24 h on steel. Other coronaviruses are known to persist at 4-C for more than 28 days (Casanova et al., 2010). Based on these findings, hypothetically, SARS-CoV-2 could transmit into food or food package surfaces from inanimate surfaces or by contamination with feces containing live viruses and could potentially pose a threat of infection.

What is being done about it

To date, there is no vaccine found or any other treatment available to treat SARS-CoV-2 infection. Researchers are conducting several studies to better understand SARS-CoV-2 and to find a vaccine. The CDC and WHO have recommended general public to wear masks, keep social distance and frequently wash hands with soap to minimize the spread of this disease. Food safety authorities have set guidelines for the food industry to ensure the safety of food. It is possible that food handlers could introduce the virus to food and food contact surfaces due to coughing and sneezing while handling the food. In the perspective of food industry, use of best practices could reduce the risk of contamination of food and food packages, as well as the infection among workers. The virus contains a lipid bilayer surrounding the nucleocapsid that house the virus RNA. Also, the lipid bilayer house both spike and structural proteins of the virus. Washing hands with soap is considered the best method of prevention, because soap easily dissolves the lipid bilayer, thereby releasing the nucleocapsid. Soap is composed of fat

like molecules similar to the lipid molecules in bilayer. When soap is used well enough, the interaction between soap and bilayer dissolves the bilayer destroying the virus and gets washed away by water. Good cleaning and hygiene practices are recommended to prevent cross contamination between food in the processing facilities. Employers are requested to inform food handlers to report and avoid handling food if they show symptoms. Cooking food to proper temperatures is known to kill the virus. Frequently cleaning the touch points such as door handles, also could reduce the persistence of pathogens on those surfaces

Conclusion

Based on the previous studies conducted on SARS-CoV and MERS-CoV, it is highly unlikely that they could be infected through food. However, even though coronavirus cannot grow on food as they require a host to grow, it is possible that virus could transmit through food surfaces and food packages due to their ability to persist on the inanimate surfaces. Therefore, following general guidelines for managing infectious diseases and practicing good manufacturing practices in the food processing plants could avoid infecting workers and contaminating food products.

Reference

- CASANOVA LM, JEON S, RUTALA WA, WEBER DJ, SOBSEY MD. Effects of air temperature and relative humidity on coronavirus survival on surfaces. *Appl Environ Microbiol.* 2010;76, 2712-2717.
- CHEN Y, LIU Q, GUO D. Emerging coronaviruses: genome structure, replication, and pathogenesis. *J Med Virol.* 2020;92, 418-423.
- GUAN W-J, NI Z-Y, HU Y, LIANG W-H, OU C-Q, HE J-X., et al. Clinical characteristics of coronavirus disease 2019 in China. *New Eng J Med.* 2020; 382, 1708-1720.
- HOLMES K, LAI M. *Fields virology.* Fields BN et al., editors. *Fields Virology*, third ed. Lippincott-Raven Publishers. 1996; 1075-1094.
- HUANG C, WANG Y, LI X, REN L, ZHAO J, HU Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet.* 2020; 395, 497-506.
- KAMPF G, TODT D, PFAENDER S, STEINMANN E. Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. *J Hospital Infect.* 2020; 104(3), 246-251.
- LU R, ZHAO X, LI J, NIU P, YANG B, WU H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *The Lancet.* 2020; 395, 565-574.

OTTER J, DONSKEY C, YEZLI S, DOUTHWAITE S, GOLDENBERG S, WEBER D. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hospital Infect.* 2016; 92, 235-250.

SU S, WONG G, SHI W, LIU J, LAI AC, ZHOU J, et al. Epidemiology, genetic recombination, and pathogenesis of coronaviruses. *Trends in Microbiol.* 2016; 24, 490-502.

TIAN Y, RONG L, NIAN W, HE, Y. Gastrointestinal features in COVID-19 and the possibility of faecal transmission. *Aliment Pharmacol Ther.* 2020; 51(9), 843-851.

VAN DER HOEK L, PYRC K, JEBBINK MF, VERMEULEN-OOST W, BERKHOUT RJ, WOLTHERS KC, et al. Identification of a new human coronavirus. *Nature Med.* 2004;10, 368-373.

VAN DOREMALEN N, BUSHMAKER T, MORRIS DH, HOLBROOK MG, GAMBLE A, WILLIAMSON BN, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *New Eng J Med.* 2020; 382, 1564-1567.

WANG C, HORBY PW, HAYDEN FG, GAO GF. A novel coronavirus outbreak of global health concern. *The Lancet.* 2020; 395, 470-473.

WÖLFEL R, CORMAN VM, GUGGEMOS W, SEILMAIER M, ZANGE S, MÜLLER MA, et al. Virological assessment of hospitalized patients with COVID-2019. *Nature.* 2020; 581(7809), 465-469.

WONG SH, LUI RN, SUNG JJ. Covid-19 and the digestive system. *J Gastroenterol Hepatol.* 2020; 35(5), 744-748.

WU Y, GUO C, TANG L, HONG Z, ZHOU J, DONG X, et al. Prolonged presence of SARS-CoV-2 viral RNA in faecal samples. *Lancet Gastroenterol. Hepatol.* 2020; 5, 434-435.

XIAO F, TANG M, ZHENG X, LIU Y, LI X, SHAN H. Evidence for gastrointestinal infection of SARS-CoV-2. *Gastroenterology.* 2020;158, 1831-1833. e3.

ZHAO S, LIN Q, RAN J, MUSA SS, YANG G, WANG W, et al. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *Int J Infect Dis.* 2020; 92, 214-217.

ZHOU P, YANG X-L, WANG X-G, HU B, ZHANG L, ZHANG W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature.* 2020; 579, 270-273.

Optimization of inclusion of primers for an internal control in the reverse transcriptase polymerase chain reaction (RT-PCR) test in detection of BCR-ABL p210 translocation

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Abstract

Leukemia is a form of haemopoietic cancer with a diversity of biologically distinct subgroups. Leukemia cancer development in blood and bone marrow cells is involved in many of the translocations. BCR-ABL translocation is present in 99% of Chronic myelogenous leukemia (CML) patients and 40% in Acute myelogenous leukemia (AML) patients. To identify and quantify leukemic cells in CML or ALL leukemic patients, these translocations are used as molecular makers.

The main objective of this study is to find out an optimization of the inclusion of primers for internal control in the RT-PCR test in the detection of BCR-ABL p210 translocation. Other objectives include Identifying strengths and weaknesses of RT-PCR method such as cost-effectiveness, rapidity, turnaround time, sensitivity and resource intensiveness.

PCR is a rapid, highly sensitive and accurate method of testing. RT PCR was used as the main method. The enzyme reverse transcriptase is used in RT PCR to alter the specific piece of RNA into a matching piece of DNA and to amplify specific DNA targets using PCR. Nested PCR is also used for as a modification of PCR envisioned to decrease non-specific binding products due the amplification of unexpected primer binding sites.

Study was carried out using different primers, various reactions and PCR machines. RT-PCR, nested PCR, monoplex PCR and multiplex PCR reactions were done to get better results. Four different types of primer pairs were used to optimize the PCR reactions. There were two target chromosomes in the study to detect Philadelphia and those were chimeric chromosome and Chromosome 9. For the internal control reaction a primer pair that can be annealed only on to the chromosome 9 near the breakpoint was selected.

Purpose of having an internal control in a PCR reaction is to avoid or eliminate false negative results and to increase the accuracy of final output. Internal controls are ideal for monitoring of BCR contents and it is important to distinguish BCR-ABL low copies. After the optimizations, A2/CA3 primer pair which was used in the PCR reactions can be conclude as the suitable internal control for detection of Ph p210 variant. Hence decreasing the risk associated with false negative results.

Keywords

Leukemia, BCR-ABL translocation, Philadelphia, p210 variant, RT-PCR, Internal control, Optimization

Introduction

Cancer is the second foremost cause of mortality worldwide and every sixth death in the world is due to cancer (Hassanpour and Dehghani, 2017; WHO, 2020). Uncontrolled cell proliferation and uncontrolled cell division lead to the accumulation of an unusual cell population caused for cancer which threatens life by interfering with essential body functions (López-lázaro, 2016). Leukemia is a cancer in the blood-forming tissues of the body containing the lymphatics and the bone marrow caused by excessive white blood cells (WBC) (Khanna, 2018). WBC aid in fighting diseases by preventing the body from producing red blood cells and platelets. Leukemia can progress from a grouping of environmental factors and genetics (Institute of Medicine, 2012). Usually, leukemia is occurred when certain blood cells acquire mutations in the DNA, It has the highest mortalities of any cancer and 3.4% of death from all cancer (Hao et al., 2019). According to the WHO Leukemia deaths in Sri Lanka reached 0.62% of total deaths in year 2018. Leukemia can be classified as acute lymphoblastic leukemia (ALL), Chronic myelogenous leukemia (CML), chronic lymphoblastic leukemia (CLL) and acute myelogenous leukemia (AML). The main cause for CML is an abnormal fusion gene BCR-ABL. A BCR-ABL gene is formed when fragment of 22 and 9 are translocated in which BCR gene on chromosome 22 is joined to the ABL gene on chromosome 9. A mutual translocation in the extended arms of chromosomes 9 and 22, t (9,22) (q34, q11) results in the development of the Philadelphia (Ph) chromosome. Due to the highly sensitivity and specificity for nucleic acid amplification, RT-PCR is use for detection of Ph. RT-PCR specifies the initial diagnostic phase in the patients. The purpose of having an internal control (IC) in a PCR reaction is to avoid or eliminate false-negative results and increase the accuracy of the final output. Therefore quality control of the testing system will improve. Also reliability, and sensitivity of primers to measure a treatment failure will be increased (Stanoszek et al., 2013).

In each year globally an estimated 300,000 new incidences of leukemia are diagnosed. It is 2.8% of all new cancer cases. In western countries, it has been estimated the CLL constitutes are the most common type of leukemia and as a percentage, it is 25 of all cases. 20% of cases represent the CML and AML respectively (Jemal et al., 2009).

Internal controls are optimum for molecular monitoring of BCR-ABL load (Wang et al., 2006). It is significant when a low number of BCR-ABL copies are available to detect. The inclusion of primers will give a much better interpretation efficiency and it will increase the quality of final results (Bustin and Nolan, 2004). The general objective of this study is to optimize the inclusion of primers to function as an internal control in the RT-PCR test in the detection of BCR-ABL p210 translocation. Thereby minimize or eliminate the reporting of false negatives as negative patients.

Significance

For many years BCR-ABL translocation had been identified cytogenetically (Hu et al., 2017). Though, lately, these cytogenetic processes have been widely traded by PCR based procedures. Unique sensitivity and high specificity are the main benefits of PCR

and capable of identifying the altered gene among numerous normal leukemic clones. Hence, Philadelphia detection, PCR is much beneficial than cytogenetics (Sidorova et al., 1997).

Recently, BCR-ABL detection is rapid and much simplified. The main significance is detection of BCR-ABL translocation is dominant to the strikingly positive diagnosis, monitoring of CML and treatment. The prognosis rate is very high in CML. Latest researchers showing that it can be easy to indicate how patients will fare by their early response. At three months patients who do worsen have an extremely minor possibility of survival than patients who have an improved response at three months (Paxton, 2020).

Controls in PCR detection aid in the interpretation of results by identifying adverse factors. It prevents the possibility of a false positive result and certifies the identification of the mutation with the use of proper positive controls. In detection workflows negative controls are well produced. Evaluation failure due to inhibition of PCR or RT-PCR can create a false negative. Possible false that can lead to false negatives. Inclusion of IC is confirms that a negative result is truly negative and is the most applied method to control inhibitors.

Primers which were used in this study are specific for the detection of the p210 variant of BCR-ABL translocation. There were not many published data is available using these specific primers and the method used in this study. Although many recent advances are available to detect BCR-ABL translocation using this technique in Sri Lanka is not economically viable. Therefore development of a reliable low cost method is vital for routine application for the diagnosis of this disease. Also there are not many previously published reports on BCR-ABL analysis done in Sri Lanka to compare with genetic level analysis has not been common in Sri Lanka due to the high cost and unavailability as well.

Methodology

The experiment was carried out with 13 samples of extracted RNA and 2 extracted DNA samples which were provided by the laboratory with positive and negative controls. The RNA samples which were used in the test have been recently analyzed upon the request of a physician for detection of the Philadelphia chromosome Translocation. Four optimizations were done along with initial RT and nested PCR reaction. In this study optimization was carried out by using different primers and PCR machines. Sequences of the primers which were used in this study were obtained from a previous research article which was done to detect BCR and ABL genes in CML/ALL patients in UK by evens and sillibourne (1996). NB1 primer and B2A primer were designations of BCR gene and ABL3 and CA3 primers were designation of ABL gene. These four primers were used to detect translocation and A2/CA3 primer pair used as internal control primer. Optimization was carried out by using two different PCR machines. Many processes were done by using Applied Biosystems 2720 thermal cycler PCR machine and in one process was done by assay Perkin elmer geneamp PCR system 9600 machine. Agarose gel electrophoresis method was performed with both RT and nested PCR products.

Results

RT-PCR results indicated that used primers were appropriate for p210 variant of BCR-

ABL translocation. All the positive samples were given exact band sizes for used primer pairs and A2/CA3 primer pair which was used as internal control showed expected band sizes for all the Philadelphia positive samples. Bands were not visualized for negative controls proving zero contamination.. In gel images, there were small lengths were observed in RNA samples, which were tested with RT reactions. The high lengths were always able to observe in amplified PCR products which were not tested with RT reaction. Primer diamers, some nonspecific bands were observed in some gel images.

Discussion

False-negatives probably hold some issues for the individual. As an example, in the setting of screening for cancers, a missed diagnosis cause such a main medical effect by probably being a fact to additional delay in detection. Time lost due to false negative results will delay the proper management of the disease. During that time cancer can get worse and becomes indicative, it may be at a more progressive phase leading to requirement of more invasive treatment which may also be less effective. The treatment can be expensive which means the patient might need to seek any legal redress for any distress that has been caused. Therefore evidence for the implications of false negatives can be categorized as medical, psychological, legal and economic implications.

For elimination of false negative in routine testing atBCR-ABL translocation using RT-PCR, A2/CA3 primer pair can be included. CA3 primer can be included in the RT-PCR as the reverse primer along with the NB1 primer. PCR mixture can be continued by using both CA3 and Abl3 primers. From this study it can be concluded that better machine for routines testing for the detection of BCR-ABL p210 translocation is Applied Biosystems 2720 Thermal cycler. Rapidity of this method can be conclude as high and turnaround time was reasonable and the sensitivity and specificity is high the used primers. To evaluate the results, serial dilution can be performed as a future development. From the serial dilution series will be able to determine the exact concentrations for RNA samples to get similar band sizes for all the results. It will give the same intensity for all the samples. To further confirm this results another assay using a larger number of samples can be performed.

Conclusion

For elimination of false negative in routine testing at BCR-ABL translocation using RT-PCR, A2/CA3 primer pair can be included. CA3 primer can be included in the RT-PCR as the reverse primer along with the NB1 primer. PCR mixture can be continued by using both CA3 and Abl3 primers. From this study it can be concluded that better machine for routines testing for the detection of BCR-ABL p210 translocation is Applied Biosystems 2720 Thermal cycler. Rapidity of this method can be conclude as high and turnaround time was reasonable and the sensitivity and specificity is high the used primers.

References

- Al-Achkar, W., Wafa, A., Ikhtiar, A. and Liehr, T. (2013) Three-way Philadelphia translocation t(9;10;22)(q34;p11.2;q11.2) as a secondary abnormality in an imatinib mesylate-resistant chronic myeloid leukemia patient, *Oncology Letters*, Spandidos Publications, 5(5), pp. 1656–1658.
- Bustin, S. A. and Nolan, T. (2004) Pitfalls of quantitative real- time reverse-transcription polymerase chain reaction, *Journal of Biomolecular Techniques*, The Association of Biomolecular Resource Facilities, pp. 155–166.
- Chasseriau, J., Rivet, J., Bilan, F., Chomel, J. C., Guilhot, F., Bourmeyster, N. and Kitzis, A. (2004b) Characterization of the different BCR-ABL transcripts with a single multiplex RT-PCR, *Journal of Molecular Diagnostics*, 6(4), pp. 343–347.
- Evans., H and Sillibourne., J (1996), Detection of bcr-abl gene in CML/ALL patients. *Promega notes Magazine* 57:21.
- Hassanpour, S. H. and Dehghani, M. (2017). Review of cancer from perspective of molecular, *Journal of Cancer Research and Practice*, Chinese Oncology Society, 4(4), pp. 127–129.
- Hu, L. H., Pu, L. F., Yang, D. D., Zhang, C., Wang, H. P., Ding, Y. Y., Li, M. M., Zhai, Z. M. and Xiong, S. (2017) How to detect the rare BCR-ABL (e14a3) transcript: A case report and literature review, *Oncology Letters*, Spandidos Publications, pp. 5619–5623.
- Jemal, A., Siegel, R., Ward, E., Hao, Y., Xu, J. and Thun, M. J. (2009) *Cancer Statistics*, 2009, CA: A Cancer Journal for Clinicians, Wiley-Blackwell, 59(4), pp. 225–249.
- Khanna, V. K. (2018). *Blood Cancer, Medical Sensors and Lab-on-a-Chip Devices*, pp. 509–554.
- Kramer, M. F. and Coen, D. M. (2001). *Enzymatic Amplification of DNA by PCR: Standard Procedures and Optimization*, In *Current Protocols in Molecular Biology*, Hoboken, NJ, USA, John Wiley & Sons, Inc., pp. 15.1.1-15.1.14.
- López-lázaro, M. (2016). *Research Open What is the Main Cause of Cancer ?*, (November), pp. 2–4.
- Paxton, A. (2020) In CML, BCR-ABL monitoring takes on new importance | CAP TODAY, CAP TODAY, pp. 6–10.
- Rejali, L., Poopak, B., Hasanzad, M., Sheikhsofla, F., Varnoosfaderani, A. S., Safari, N. and Rabieipoor, S. (2015) Characterizing of four common BCR-ABL kinase domain mutations (T315I, Y253H, M351T and E255K) in Iranian chronic myelogenous leukemia patients with imatinib resistance, *International Journal of Cancer Management*, 8(3).

Sidorova, J. Y., Saltykova, L. B., Lyschov, A. A., Zaritskey, A. Y., Abdulkadyrov, K. M. and Blinov, M. N. (1997) A rapid RT-PCR based method for the detection of BCR-ABL translocation, *Journal of Clinical Pathology - Molecular Pathology*, 50(5), pp. 266–268.

Stanoszek, L. M., Crawford, E. L., Blomquist, T. M., Warns, J. A., Willey, P. F. S. and Willey, J. C. (2013). Quality control methods for optimal BCR-ABL1 clinical testing in human whole blood samples, *Journal of Molecular Diagnostics*, 15(3), pp. 391–400.

Wang, X., Lim, H. J. and Son, A. (2014). Characterization of denaturation and renaturation of DNA for DNA hybridization, *Environmental Health and Toxicology*, The Korean Society of Environmental Health and Toxicology (KAMJE), 29, p. e2014007.

Analyzing CKDu Patient's Quality of Life Using Speech Recognition Method; A preliminary Study

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Abstract

CKDu or Chronic Kidney Disease of uncertain aetiology is a silent disease that does not show any symptoms in CKD patients. The most death-defying part of this disease is that it is irreversible and asymptomatic until final stages. Hence, it needs constant attention and frequent checkups. Estimated glomerular filtration rate (eGFR) is the most common and easiest way to identify CKDu., eGFR is a calculation based on the blood test for creatinine. Considering the age, ethnicity and gender, CKDu can be categorized into five stages based on the eGFR value. Health Related Quality of Life (HRQOL) is one of the most common online questionnaires used in several parts across Europe and America. This assessment provides the healthcare practitioners and patient an understanding of the overall quality of life. This study focuses on building on integrated voice recognition technology using a type of HRQOL known as KDQOL (Kidney disease quality of life assessment questionnaire) that would map out patient responses and provide scores through online platform. The main objective of the study is to integrate digital healthcare practices and effective ways in which technology can be used to help affected individuals across the country at a low cost. Research findings have demonstrated that majority of the affected population are from rural areas of the country. Most importantly farmers and other people involved in agricultural activities are most liable to be affected.

Keywords

CKDu, , HRQOL, KDQOL, e-GFR

Introduction

Chronic kidney disease of unknown origin is a disease that is prominent in farming communities, especially in the North Central Province (NCP), Sri Lanka. Most commonly this disease is evidently found in Sri Lanka, India and Central American countries such as Guatemala and Nicaragua, etc. CKDu is a unique kidney disease since it has no symptoms or signs that rectify the presence of kidney disease during early stages and

it generally carries a poor prognosis. Unlike CKD with identified predisposing factors such as diabetes mellitus, high blood pressure and hypertension, CKDu lacks identified predisposing factor hampering early diagnosis (Anand et al., 2019).

An estimated 3.2 million people are suffering from end stage renal disease (ESRD) each year caused by different forms of kidney disease out of which only 14% are able to undergo renal replacement therapy making CKDu is one of the most devastating and non-communicable diseases. Due to economic constraints and the disease being more prevalent in low- or middle-income countries, alternative options have been explored as a part of the disease management. Following the recommendations of WHO, the usage of traditional medicines has been considered as an alternative approach in improving quality of life of these patients (Aslam, Hakmanage and Galgamuwa, 2019; Aslam, 2020).

With the prevailing economic crisis and the ongoing pandemic, the fatalities caused by CKDu can be on the rise in upcoming years. In order to assess patients in an effective manner, KDQOL can be used as a prognostic tool for early patient diagnosis using quality of life assessment. As the tool is available online in English and been validated in Sri Lanka over the local language of Sinhala (Senanayake et al., 2017) current study focused on building a voice integrated software that would allow patients to respond in the local language for the KDQOL questionnaire. Similar voice recognition softwares have been developed over time (Mirzaei et al., 2018; Haq et al., 2019). Deep learning was used for this study for speech recognition which will be aided by artificial intelligence in mapping out answers and questions in Sinhala for the KDQOL.

Methodology

Sound generated by a human is filtered by the shape of the vocal tract including tongue and teeth. This shape determined what sound output came out of the person. If this shape can be identified, then the utterance can be identified (practical cryptography) as well. In this research 120 voice clips were recorded from 10 individuals who they were answering the questions in the KDQOLquestionnaire. Voice recordings were originally recorded at 44100 Hz. To remove background noise, an envelope was created with a threshold value. All the signal components below that threshold value were dropped and a clean signal was generated without background noise and the new samples were down sampled to 16000 Hz.

Then, framing and windowing techniques were used to get 20 ms windows and got 320 samples per second. Then using Mel frequency Cepstral Coefficient analysis, 2-13 feature coefficients were extracted. After that these features were fed to a Recurrent Neural network and a Convolutional Neural Network to find patterns and do the classification for three classes named "Hodai", "Madyasthai", "Narakai".

Results and Discussion

Voice signals in time domain

Here you need to write about your result and then insert the figure

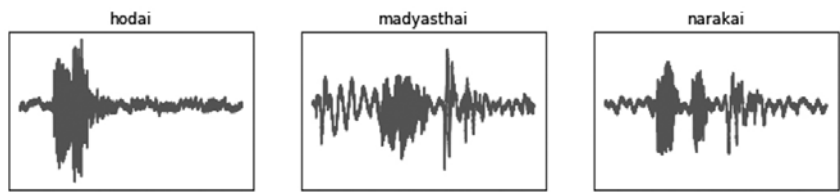


Figure 1: Frequency changes over the three assigned categories

Spectral representation of MFCC filter banks

Explain your results

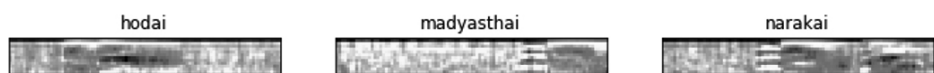


Figure 2: Visualization of the spectral dynamics

120 samples were used to train the CNN and RNN models.3375 samples for training and 375 samples for validation was created and Using these samples this research was able to get 65.6% validation accuracy from using the CNN and 40.8% validation accuracy for RNN.

Confusion Matrix for Testing

Explain your results first and then add the figure

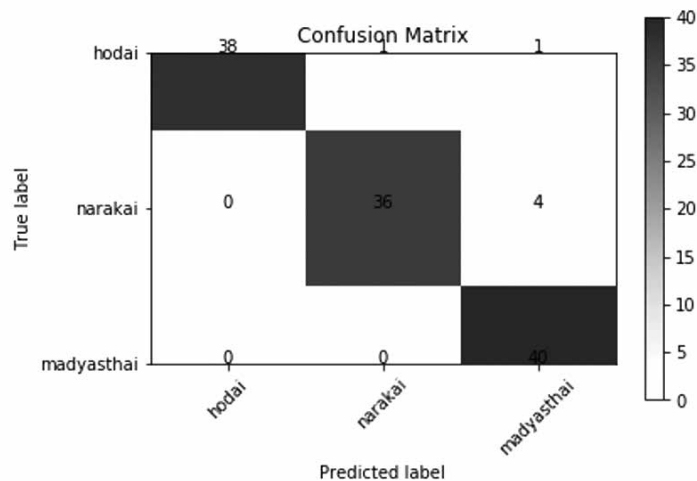


Figure caption?

Table caption?

Heading?	No. of speech recordings	Correctly Identified
Hodai	40	38
Madyasthai	40	36
Narakai	40	40

Explain the table as well

Conclusion

With the 120 voice recordings collected in the current study initial findings have shown a 70% accuracy in interpreting the outputs from the patient's speech recognition. Over time with more training datasets incorporated into the model we expect to reach 90-95% and will be available for the Sri Lankan community in the next year. Further studies are required to develop the model further to provide better results and outputs.

References

Anand, S., Caplin, B., Gonzalez-Quiroz, M., Schensul, S. L., Bhalla, V., Parada, X., Nanayakkara, N., Fire, A., Levin, A. and Friedman, D. J. (2019). Epidemiology, molecular, and genetic methodologies to evaluate causes of CKDu around the world: report of the Working Group from the ISN International Consortium of Collaborators on CKDu, Kidney international, Elsevier, 96(6), pp. 1254–1260.

Aslam, F. (2020). Risk factors associated with chronic kidney disease of unknown origin (Ckdu) in North Central Province (NCP) of Sri Lanka: An analysis of evidence to date, Acquaint Publications.

Aslam, F., Hakmanage, N. and Galgamuwa, L. (2019). Follow up Study on Sri Lankan Traditional Medicine Treatment on Diagnosed Chronic Kidney Disease of Unknown Etiology Patients in Kebithigollewa, North Central Province (NCP), Sri Lanka., Kidney International, 5.

Haq, A. U., Li, J. P., Memon, M. H., Malik, A., Ahmad, T., Ali, A., Nazir, S., Ahad, I. and Shahid, M. (2019). Feature selection based on L1-norm support vector machine and effective recognition system for Parkinson's disease using voice recordings, IEEE access, IEEE, 7, pp. 37718–37734.

Mirzaei, S., El Yacoubi, M., Garcia-Salicetti, S., Boudy, J., Kahindo, C., Cristancho-Lacroix, V., Kerhervé, H. and Rigaud, A.-S. (2018). Two-stage feature selection of voice parameters for early Alzheimer's disease prediction, IRBM, Elsevier, 39(6), pp. 430–435.

Senanayake, S., Gunawardena, N., Palihawadana, P., Kularatna, S. and Peiris, T. S. G. (2017). Validity and reliability of the Sri Lankan version of the kidney disease quality of life questionnaire (KDQOL-SFTM), Health and quality of life outcomes, Springer, 15(1), p. 119.



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A study on the impact of ragging on psychological well being among peradeniya university students

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Abstract

Higher education is a golden opportunity which is not appreciated by many of those students who are lucky enough to walk in to a University. 'Protests' and 'Ragging' have become the two immediate words anybody could use to define the state education system in Sri Lanka today. The once highly respected free education system founded by the late C.W.W.Kannangara now has opened doors to criminals to involve in violent form of ragging in Universities of Sri Lanka. As such ragging has once again spread its wings sickening state. Ragging has become a frequent practice in state universities of Sri Lanka which has created physical, mental and social issues among students whose quality of lives are affected and also has increased the rate of students leaving the University due to fear of ragging taking place in University premises. Suicidal rates among students have also increased due to ragging causing immense pressure to their parents and beloved ones. Data for this research were collected from the students, a graduate and a lecturer at University of Peradeniya. The research report concludes that, though there are laws implemented to minimize the effects of ragging among state university students, but they are not implemented in an effective manner and even the relevant institutions, authorities and organizations has not taken any preventive measures to control or minimize effects and impacts of ragging on quality of life style of state university students.

Keywords

Ragging, State University

Introduction

Ragging is the term used for the so called "initiation ritual" practice in higher education institutions in South Asian countries, including India, Bangladesh and Sri Lanka. The practice is similar to hazing in North America, bizutage in France, Praxe in Portugal and other similar practices in educational institutions across the world. Ragging involves abuse, humiliation or harassment of new entrants or junior students by senior students. It often takes a malignant form wherein the newcomers may be subjected to psychological or physical torture.

There is no record to suggest that ragging is an indigenous phenomenon or was present in the ancient Sri Lankan educational institutions such as Mahavihara or Abhayagiri Vihara. It is widely considered to have been introduced during the post-World War II era as a result of British colonialism in Sri Lanka. Sri Lankan soldiers returning from war re-entered college educational system and brought with them the traditions and technique of military style ragging. As fewer persons entered the universities, ragging devolved into a violent and hazardous exercise that has been largely utilized for political purposes.

Student ragging in Sri Lankan Universities began in 1974, when some trainee mathematics teachers at Kelaniya University were ragged by seniors. One year later, University of Peradeniya reported the first ragging related death when a 22 year old female student of Faculty of Agriculture, became paralyzed as a result of jumping from the second floor of the hostel, to escape the physical ragging carried out by her seniors. She committed suicide later.

Today 46 years later, brutal ragging in our higher education institutes is still a stark reality. No longer ragging the light hearted thing of past. Today, it is a crude and sadistic exercise that, despite widespread censure, continuous to be inflicted on unsuspecting freshers by senior students. As an educated society we should be ashamed for not taking appropriate action to curb this menace for such long period.

The overall objective of this study was to identify the nature of violence taking place in Universities, to find out how the quality of life of University students get affected due to ragging, to find out whether ragging is essential in Universities and to suggest method to prevent and control violence related to ragging in Universities.

Literature Survey

Though there are enough of Laws related to rights of people, such as the Articles 11 and 126 of our constitution which has granted rights to every citizen to protect themselves from torture, inhuman activities, and has granted right to file a petition to Supreme Court in case of human rights violation, but these are being violated by University students by engaging in ragging in a brutal manner. And also Parliament passed an Act in 1998 in order to prevent ragging in state universities, but they are not properly followed by the government and no proper measures are taken in order to punish those who involve in ragging in a violent manner.

So it is the duty of the Sri Lankan government and relevant authorities to consider this as a serious matter and take necessary actions in order to minimize the impacts of ragging on quality of life of state University students, since it has turned in to a major issue at present which sometimes leads students to commit suicide when ragging becomes an unbearable act.

Methodology

Twenty questionnaires were distributed among the students of Peradeniya University. All questionnaires were answered and returned, and set for interpretation. 14 (70%) female and 6 (40%) male students answered the given questionnaire. Data gathered from the questionnaire were analysed based on frequency counts.

The Quantitative analysis was followed by a Qualitative analysis of data which was used to gather more inside and detailed information on the subject of the research. The aspect of research was done by conducting interviews. The views were collected from a Lecturer and a Graduate Teacher of University of Peradeniya. The interview was brief and consisted of 5 questions regarding the subject view and the opinion on the ragging that is taking place in University of Peradeniya.

Results and Discussion

Though ragging is known to be a conduct which enhances the relationship between juniors and seniors, due to its violent form it creates distance between the junior and senior students. So throughout the University life as well as afterwards, this creates a negative effect between the students and the society. Also ragging causes various effects on students, physically and mentally affecting their life, their future as well as their higher education. According to this study it was also obvious that, ragging has affected the male students the most but it has also affected number of female students as well. And this study also revealed that most of the University students had no idea regarding the Act which was passed by the Parliament of Sri Lanka in order prevent the effects of ragging on state University students.

Conclusion

The research concludes that the ragging which takes place in the State Universities at present, takes a violent nature and day by day it has turned in to a serious matter which should be taken in to consideration by the State, society as well as by the relevant authorities in order to minimize the impacts of ragging on quality of life of State University students.

Reference

- Daily news. 2019. Just Stop Ragging. [online] Available at: <<http://www.dailynews.lk/2019/4/25/features/183727/just-stop-ragging>> [Accessed 7 October 2019].
- srilankabrief. 2019. Ragging In Srilankan Universities Academical Institutions Turn Torture Camps. [online] Available at: <<http://srilankabrief.org/2019/08/ragging-in-srilanka-universities-academical-institutions-turn-torture-camps/>> [Accessed 11 November 2019].
- n.d. University Ragging A Curse Or Privilege. [online] Available at: <<http://www.ft.lk/opinion/University-ragging--A-curse-or-a--privilege--/14-685907>> [Accessed 7 October 2019].
- studentlanka. 2019. Ragging In Srilankan Universities. [online] Available at: <<http://studentlanka.com/2019/07/02/ragging-in-srilanka-universies/>> [Accessed 14 November 2019].
- The morning.[online] Available at: <<http://www.themorning.lk/pg3lead-4/>> [Accessed 29 October 2019].
- Lawnet [online] Available at: <<http://www.lawnet.gov.lk>> [Accessed 12 October 2019]
- Srilankalaw [online] Available at: <<http://www.srilankalaw.lk>> [Accessed 7 November 2019]

The rule of law in Sri Lanka; A critical analysis

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Abstract

Tkacheva, who has waived her anonymity as a rape victim, is ready to give evidence at any trial. "I was devastated when the men were freed on bail," she said. To overcome the unfairness which was caused to Tkacheva in Sri Lanka where she was raped and the rapists were released and one of the rapist was an ally of the then Sri Lanka president Mahinda Rajapaksha, the British high commission did involve in this Sri Lankan case. This case of Khuram Shaikh Zaman shows that the law of Sri Lanka is being broke by the higher officials. The rule of law is the influence of law in society, the principle whereby all members of a society (including those in government) are considered equally subject to publicly disclosed legal codes and processes." The phrase "the rule of law" refers to a political situation, not to any specific legal rule. But the real question in today's context is whether the rule of law is being followed in the proper manner especially by the law makers, the law enforcement officials and the judges. The overall aim of the study is to investigate the importance of Rule of Law and whether the Rule of Law is actually guaranteed in Sri Lanka. The research is divided into three sectors which includes the law being broke by the Executive, the rule of law not being guaranteed by the legislature and the judiciary too which has to guarantee the rule of law does not. To get the opinions of the public with regard to this, questionnaires were distributed to a particular sector of students and to general public of different age sectors. Also, interviews were conducted with people from different fields to get a proper idea and to arrive into a conclusion and the interviewee's include a Judge, Army officer, Lawyer and a prisoner. By analyzing the data collected by the general public the conclusion that could be arrived is that though not totally at least to some extent the rule of law is not totally guaranteed by the three main bodies namely: Executive, Legislature and the Judiciary. Moreover, it was found out that regardless of who they were both the general public and legal professions were in favor of imposing special sanctions to these bodies when they did not abide by the law and that the judiciary should have more power with regard to rule of law. "The JVP held a protest rally at Nugegoda on 1st November demanding the president to reconvene parliament and to restore democracy in country". This very quote shows that the executive of the country did not guarantee the rule of law.

Keywords

Rule of law, Executive, Legislature, Judiciary and Unconstitutional

Introduction

The rule of law not merely requires that a government should act according to law, but also that the body of law in existence in a country should be in accordance with certain minimum standards of equity, justice and good conscience. The rule of law underlies the entire constitution and in one sense all constitutional law is concerned with the rule of law. The rule of law cannot be viewed in isolation from the political society. Political

leaders opposing the requirements of the rule of law are not exceptional. In failed states it is even common to ignore the rule of law.

Within this aim the research has a number of research objectives:

1. To examine whether rule of law is equally implemented
2. To identify if the legislature is abiding by the laws
3. To study whether the higher officials use law for their own purpose
4. To analyze if the judicial system includes the principles of rule of law

Background / Literature Survey

For this research three main cases have been used with regard to the three main sections.

The rule of law not being guaranteed by the executive: The removal of the Prime Minister Ranil Wickremasinghe by President Maithripala Sirisena: Unconstitutional.

The rule of law not being guaranteed by the legislature: Impeachment of chief justice Shirani Bandaranayaka was illegal.

The rule of law not being guaranteed by the judiciary: The case of Khuram Shaikh where the then president involved in the rulings of the case.

Research Methodology

The study focuses on human behavior towards rule of law and its articles and whether it's actually guaranteed. The research approach used is therefore is a mix of

1. Qualitative – to explore and acknowledge the knowledge of the general public regarding rule of law
2. Quantitative – A quantitative research approach was used in the study to help solve the research problem by collecting numerical data and collecting the opinion of a sample population with regard to rule of law.
3. Explanatory
4. Descriptive.
5. Sampling Method – Both probability and non-probability sampling techniques were used. 20 people were taken between ages 18 and above as probability sample and 4 people were selected as non-probability sample.
6. Questionnaire – Data for this study was collected by handing out questionnaire through which ideas of the general public was evaluated with regard to rule of law being guaranteed.
7. Interview – The researcher conducted semi structured interviews with 4 individuals for the purpose of the study

Results

The answers given by the public is stated below,

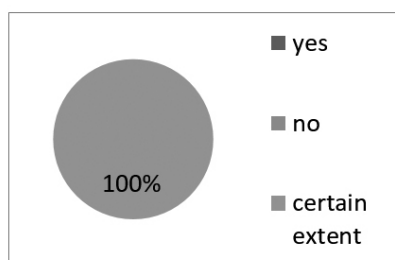


Fig: 1 (age- 20-25)

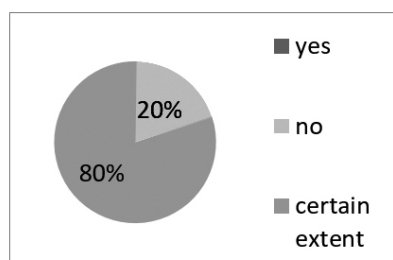


Fig: 2 (age - 26)

The youngsters agree that the rule of law is guaranteed only to a certain extent. The figure two on the other hand has a different opinion where 80% are on the view that it's guaranteed to a certain extent.

What could be seen as a common factor for both the group is that there was no person who agrees that the rule of law is totally guaranteed.

Conclusion

The researcher aimed to identify the current situation of the country and how important the rule of law is and is it actually being guaranteed as it should be, and how far the general public is aware of that. One theme that emerged from the results of quantitative data analysis was the idea that rule of law is guaranteed only to a certain extent.

This research concludes that the rule of law which is the supremacy of the law is not being guaranteed by the three main bodies namely, executive, legislature and judiciary. Imposing sanctions for not guaranteeing the rule of law would be an ideal solution or in the least it would reduce the higher officials acting on their own wish.

References

Colombo telegraph , 2013. Full Text Of The Five Judge SC Bench Ruling On CJ Shirani Badaranayake Impeachment Case. [Online] Available at: <https://www.colombotelegraph.com/index.php/full-text-of-the-five-judge-sc-bench-ruling-on-cj-shirani-badaranayake-impeachment-case/> [Accessed 21 May 2019].

Sirilal, R. & Aneez , S., 2013. Sri Lankan chief justice impeachment illegal: Supreme Court. [Online] Available at: <https://www.reuters.com/article/us-srilanka-impeachment/sri-lankan-chief-justice-impeachment-illegal-supreme-court-idUSBRE90209D20130103> [Accessed 20 May 2019].

Sunday Times, 2018. Removal of the Prime minister. [Online] Available at: http://www.sundaytimes.lk/100725/News/nws_37.html [Accessed 20 May 2019].

Effects of physical punishments against the child right laws in Sri Lanka (Nuwara-eliya)

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Abstract

The Child right laws of Sri Lanka consist many circulars to the government schools. It clearly lays down the laws on prohibition of physical punishments. These laws on circulars were amended time to time. Even though the circulars lay down such rules, the administration especially in government schools say it is very impractical to mould the younger generation without physical punishments. This is a prevalent issue in Sri Lanka. The Exploration is based on the government schools of the Nuwara-Eliya region Sri Lanka.

This research has proved why physical punishment is sometimes so much essential in the modern society among the younger generation. The Child right laws in Sri Lanka are essential as to curb intolerable corporal punishments. But, at the same time, the laws must be amended as to legalize certain physical punishments to be implemented in schools to curb social issues and immoral acts within the youngsters. Many students indicated that they understood the need for correction when they misbehaved. They appear to tolerate corporal punishment, possibly even at abusive levels, if it is done by teachers whom they viewed were skilled in teaching. Their parents too do not complain against such teachers. Despite so, students do indicate a great preference for advice and support when they misbehave, rather than the use of punishment. However, teachers and principals are of the firm view that only (positive) discipline (such as advice and support) does not work in correcting misbehaviors, and that it has to be combined with punishment. Moreover, the students reported that they do not tolerate punishment when used by teachers whom they believe are unskilled in teaching, and, it was also reported that such teachers are in the majority. Parents too are prone to report these teachers to higher authorities. With such teachers, the students reported that they continue their misbehaviors which then lead to further punishment. Hence, a vicious cycle of violence prevails in schools in Sri Lanka. The law must definitely take actions against unwanted, cruel, inhuman corporal punishments.

These findings have important implications on how amendments should take place in the legal forum. It's important to implement certain corporal punishments with limits to control immoral behaviors within the school students. On the other hand, child rights also must be protected with care. Society is moving forward with technological advances. Though it brings advantageous feedback to society it also draws the youth into immoral, misbehaviors. Certain issues cannot be dealt only by positive feedback. In the day to day setting these positive feedbacks do not always play a successful role in curbing moral behaviors amongst the younger generation comparing to the physical punishments.

Thus, physical punishments must be implemented within its limits by focusing on the child right laws in the country and also the limits for these punishments must protect the rights of the children as well.

Keywords: Physical punishments, Child Rights, curb, moral issues, younger generation.

Introduction

Correcting student misbehaviors is an important yet controversial task entrusted to teachers. This is so as there is a global awakening to the detrimental impact of certain methods of correcting misbehaviors. These methods are referred to as punishments and are broadly classified as corporal punishment and psychological aggression. Other than escalating to physical abuse, corporal punishment has been associated with depression, hostility and lowered academic performance.

This research is conducted to access the current situation of physical punishments in Schools and to evaluate on the effects of physical punishments in schools, to get opinions on physical punishments in school level by the relevant authorities (principal, teachers, ISAs) based on the school and others (parents, retired teachers), to get ideas of students regarding physical punishments given to them, to evaluate the child right laws of Sri Lanka (Government circulars) and To see the adequacy of the government laws and evaluate the pros and cons of physical punishments with regard to the laws of the country, to open the eyes of the respective authorities for amendment of these laws according to the practical situation.

The legality of physical Punishment of Children at School level varies by country. In Sri Lanka at the early stages physical punishment of minor children by parents or adult guardians which is any punishment intended to cause physical pain, had been traditionally legal. But, later the child right laws in Sri Lanka were amended after the UN convention on the Right of the child was brought in.

Along with the transition, Societies have transformed in various ways. There are pros and cons on this social transition therefore according to this transition; Physical punishment plays a role in moldings the younger generation. Although child right laws are against physical punishments especially in Sri Lankan government schools they still practice physical punishments to a certain extent within the limits.

The Child right laws of Sri Lanka consists many circulars to the government school. It clearly lays down the laws on prohibition of physical punishments. These laws on circular were amended time to time. Even though the circulars lay down such rules, the administration especially in government school say it is very impractical to mould the younger generation without physical punishments. This is a prevalent issue in Sri Lanka. The Exploration is based on the government schools of the Nuwara-Eliya region.

Background

Due to the controversial arguments on corporal punishments in Sri Lanka, books, articles, statutes, documentaries, cases both supporting and opposing the matters related to physical punishments in schools has been published and enacted. Also the information can be gathered through direct observation, questionnaire, and interviews with related characters. This study investigates a variety of incidents that has taken place due to physical punishments and also by not implementing physical punishments. There are many researches done under this concept. Further, a research / interview done in Badulla district government school by the Nuwara-Eliya Zonal office, clearly discusses

the effects of physical punishments against the laws of our country. The professionals who deal with children state that there must be limited physical punishments legalized as to mould the children morally at the present society. Further they stressed that according to the practical issues of society laws must be modified. There are Statutes related to this topic such as, Article 71 of the Children and Young Persons Ordinance (1939)⁹ provides for the offence of Cruelty to Children and Young Persons, The Penal Code Amendment Act No. 22 of 1995⁶ provided for the offence of Cruelty to Children (section 308A), Through the Penal Code Amendment Act No. 16 of 2006⁷, Section 308A -“injury” includes psychological or mental trauma. However, article 82 of the Penal Code⁸ states: “Nothing is an offence, which is done in good faith for the benefit of a person under twelve years of age, by the guardian or other person having lawful charge of that person, but is an offence by reason of any harm which it may cause/or be intended by the doer to cause, or be known by the doer to be likely to cause, to that person”.

Thus, currently in Sri Lanka, corporal punishment is lawful in the home, at school and in alternative care settings such as public and private day care, residential institutions, foster care, etc. Although section 2 of Circular No 2005/17, issued by the Ministry of Education in 2005, states that corporal punishment should not be used in schools, this had not been confirmed in the legislature.

Methodology

The methodologies which are planned to use in order to collect data are both on a Quantitative research was done by providing Questionnaires to the school administration, authorities of the education field, students, parents, etc. And a Qualitative research was also conducted through Interviews and Observation lists of the students at school, teachers in the classrooms, etc.

Types of research methods that were carried out were– exploratory and conclusive.

Results & Discussion

The paramount purpose of this study was to investigate reasons and solutions for the impact on physical punishments against the child right laws in Sri Lanka. The findings of this study are limited to the ideas of the public and observations made.

The researcher aimed to identify the current status of the impact of physical punishments against the child right laws in the country. It is evident that Sri Lankan schools specially the government schools believe that physical punishments are important for certain issues related to social, moral aspects. Further, it's evident that physical punishments should be allowed within the scope of laws.

In examining the social impact on this topic, it was apparent through the respondents and participants that they showed much preference in positive physical punishments by stating the disadvantages of physical punishments. At the same time they also showed preferences towards physical punishments with limited scope with regard to the laws of Sri Lanka. They also stated that law must take actions against severe, intolerable punishments.

Conclusion

There are pros and cons (impact) of physical punishments against the child right laws of Sri Lanka. Though child right laws emphasize on banning physical punishments, still the practice of such corporal punishments exist in the school backgrounds for number of reasons. The relevant authorities believe in positive punishments but they also say there are instances where certain issues cannot be dealt only through positive punishments, guiding and counseling, etc. it is solely based on the child's character, mentality and psychology.

Practice of corporal punishments must be with accordance to the prevailing law. It must be within the LIMITS AND WITH REASONABLE APPLICATION ONLY WHEN NEED ARISES.

References

Article within a journal

DE SILVA, D. G. H., DE ZOYZA, P., & KANNANKARA, N. (2000). Corporal punishment: Is it really Necessary? Sri Lanka: National Child Protection Authority

DEVORE, D. M. (2006). New developments in parent-child relations. New York: Nova Science.

DE ZOYZA, P. (2006). Parental use of physical force towards school children in the Colombo district: Prevalence, psychosocial correlates and psychological consequences. PhD dissertation, University of Colombo, Sri Lanka.

Book chapter or an article within a book

DE ZOYZA, P., NEWCOMB, P. A., RAJAPAKSHE, L. (2006). Corporal punishment in the Sri Lankan context: Psychological outcomes for our children. In D. M. DEVORE (Ed.), New developments in parent-child relations (pp 1-41). New York: Nova Science.

DE ZOYZA, P., NEWCOMB, P. A., RAJAPAKSHE, L. (2007). Parental physical punishment in Sri Lanka: Prevalence and children's attitudes towards its use. In D. K. BEHERA (Ed.), Childhood in South Asia (pp. 321-333). New Delhi: Pearson Education.

DE ZOYZA, P., NEWCOMB, P. A., RAJAPAKSHE, L. (2008). Outcomes of parental corporal punishment: Psychological maladjustment and physical abuse. In T. I. RICHARDSON & M. V. WILLIAMS (Eds.), Child abuse and violence (pp. 121-162). New York: Nova Science Publishers, Inc.96

BEAR, G. G. (2008). Classroom discipline. In A. THOMAS & J. GRIMES (Eds.), Best practices in School psychology V (Vol. 5, pp. 1403-1420). Bethesda, MD: National Association of School Psychologists.

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An indepth analysis on necessary law reforms to Safeguard educational rights of children living in slums in Sri Lanka

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Abstract

Sri Lankan experience on slums is discussable and it is one of current topics of national policy planners. The ratio of slums will increase day by day with chronic problems. Poverty and the lack of proper education are some key factors which stand as stumbling blocks for a smooth and steady run of a society, causing issues such as unemployment, crime and deviance, drug addiction, and low income dwellers as slum dwellers and shanty dwellers. This research examines the relevancy of adequate law reforms to ensure the educational rights of slum dwellers, focusing on the issues of poverty and lack of proper implementation of acts and conventions to safe guard the educational rights. The research "The quality of Life Study on slum Dwellers" (with special reference to Sri Lanka) by Wasantha Subasinghe discusses, the topic of the female headed families are also brought up since currently a more visible situation. And the state of Education is also highlighted, since there's a very less participation from this community to this particular sector due to the abundance of inequalities and the inefficiency of the economic system of the country. The data gathered through interviews mostly will be used in this paper as primary data. Secondary data will be gathered through a literary survey. The study area is of a population of eight hundred, divided into hundred and sixty-five families, consisting of all the four ethnicities, Sinhala, Tamil, Muslim and Burgher. However, the major part of the population represents the ethnics groups Tamil and Muslims. Education is a social indicator for mobility and holds a greater importance and value in someone throughout his/her life. And it is the main waking activity of the children from the ages of five to fifteen. In examining of the education status of the slum dwellers of the focused locality, initially the rate of literacy was estimated under the two main categories of genders males and females. Literacy is the ability to read and write. Sri Lanka is a country of a remarkably higher literacy rate. But the minority of the slum communities still faces the issue of illiteracy. It is crucial that the government should create a progress to change the image and the perceptions of the slum inhabitants, also by implementing attitude changing programmes. Therefore, it could be notified that principally the poverty culture, and the embedded perceptions, the influence of urbanization and the lack of a solid governmental structure, lack of transparency which hinder an essential growth of these communities.

Keywords

Education, Slum dwellers, Government, Poverty, Urbanization

Introduction

Slums punctuate almost every city of the world. This has become a universal phenomenon accompanying with urban growth. Along with urbanization and Sri Lanka being a third

world country, we undergo different kinds of social problems such as poverty, prostitution, gender discrimination, child abuse, alcoholism, malnutrition etc.

Among them, poverty and the lack of proper education are some key factors which stand as stumbling blocks for a smooth and steady run of a society, causing issues such as unemployment, crime and deviance, drug addiction, and low income dwellers as slum dwellers and shanty dwellers.

This research tried to study the role of education in improving the socio-economic conditions of slums in Sri Lanka. Moreover, to bring to light the poor life conditions (lack of proper education) of the slum dwellers in Sri Lanka, to manifest the nature the consequences of those conditions, to emphasize the relevant educational law reforms and acts this will create a positive impact on them and to open the eyes of the respective authorities are the main key points which addressed throughout this research study.

Literature Review

This study area principally interrogated on the socio cultural profiles, family profiles, on the economic status, and also on their general behaviours which particularly constitute of violent behaviours and therefore their experience in prison, conviction of crimes, drug use, domestic violence etc. The research 'The case of Colombo, Sri Lanka' by "Sevanatha" emphasizes the issues of poverty, and the difficulties the slum dwellers undergo on a general basis in terms of sanitation, income, social importance etc. And he also discusses the psychological view, the state of mind of the focused individuals (slum dwellers) on being a part of this community which is often considered marginalized and thus projects a different aspect to be observed on this subject. The research "The quality of Life Study on slum Dwellers" (with special reference to Sri Lanka) by Wasantha Subasinghe discusses the same factors, but the detailed reference is on the topics of family profile and under that, the sub topics, the abundance of nuclear families and the state of the home environment are discussed. Furthermore, the topic of the female headed families are also brought up since its currently a more visible situation. And the state of Education is also highlighted, since there's a very less participation from this community to this particular sector due to the abundance of inequalities and the inefficiency of the economic system of the country. Moreover, the economic profile, infrastructures, land ownership, work participation, social relations, gender roles, vulnerable behaviours are also examined. And the vulnerable behaviours are highlighted largely throughout the study since it's a controversial issue and an aspect which is embedded in their culture. Furthermore, the attitudes and ideologies the slum dwellers hold on them issues are elucidated. For instance, the subdivisions of the particular aspect, the attitudes on their home environments, on neighbourhood, attitude towards women and work, attitudes towards working women and their families, towards domestic violence are explored. Besides, the sub culture which exists within the slum dwellers, the male dominance, the gender inequality is also forced.

Research Methodology

The methodologies which used in order to collect data are both on a quantitative base and also on an exploratory, empirical base. There were two kinds of data use in the data analysis. First one is official statistics that data which were collected and presented

by the department of population and senses in their senses report in 2001. They are fully quantitative and already available. Secondly, statistics on the slum population of the study area are collected from the respective 'Grama Niladhari' division. General observations, questions and interviews from the focused community are the methods to collect data under the empirical base. Children between the ages of 5 – 18 are taken as one sample unit, for an overall conclusion of the whole community was observed in general, though which the literacy rates and unemployment rates were calculated. Since education is the major theme throughout the research, children were a main targeted group to gather the required data. Moreover, a questionnaire and interview were done in order to derive at a detailed analysis of the information.

The principal legislative enactment today, the Education Ordinance No. 31 of 1939, has completed 69 years and its provisions are outdated. A number of other Acts bearing on general education were passed since independence. Moreover, Universal Declaration of Human Rights (UDHR), ICCPR, Educational reforms in 1972, Report on child activity survey 2016 – Sri Lanka are some of the acts and policies that used to analyse, how it related to ensure the educational rights of slum dwellers.

Results and Discussion

Data analysis is typically of two kinds: qualitative research and quantitative research. Each method has their own techniques. Interviews and observations are forms of qualitative research, while experiments and surveys are quantitative research. The data gathered through interviews mostly used in this paper as primary data. Secondary data gathered through a literary survey. The study area was of a population of eight hundred, divided into hundred and sixty-five families, consisting of all the four ethnicities, Sinhala, Tamil, Muslim and Burgher. However, the major part of the population represented the ethnics groups Tamil and Muslims.

The number of slums, shanties, labour lines/derelict living quarters in the Kandy region. There are 1035 slums, 15,345 shanties and 9453 labour lines. Education is a social indicator for mobility and holds a greater importance and value in someone throughout his/her life. In examining of the education status of the slum dwellers of the focused locality, initially the rate of literacy was estimated under the two main categories of genders: males and females. Literacy is the ability to read and write. Sri Lanka is a country of a remarkably higher literacy rate. But the minority of the slum communities still faces the issue of illiteracy. However, statistical data, gathered according to the current state, it represents that the literacy rate is considerably in a satisfactory level as opposed to the general opinion pertaining to this particular category of the discussed communities.

The educational facilities available to the respondents are; 20 primary schools, 20 high schools and 7 universities.

Accordingly, they are provided with an easy access for educational facilities including a considerable number of universities offering degrees. Moreover, the schools both the primary and the intermediate are either governmental/ semi-governmental, or international schools. But, with regard to many contexts the slum residents who generally have a limited income, and larger families with at least three to five children, which make

it extremely difficult for them to meet the minimum requirements of all, tend to send their children to schools which do not add the burden of expensive school fees and the education is given free of cost. Contradictorily, it was disclosed that even though the facilities are often available, the end goal of an effective education was hardly met. This was principally due to the nature of the attitudes and the perception they had on the necessity of education.

Thus a larger part of the community, particularly the adults had a negative response towards the necessity of education. “the parents don’t necessarily encourage their children to receive the best from their education, so most of the time, they are provoked to find temporary employments such as rickshaw drivers, waiters in restaurants and putting up of a boutiques’ stated interviewee 1, which elucidates more on the causes which have led to the perpetuated issue of the ineffective state of education. It elucidates that they held different outlooks on the necessity of education, with the majority representing a negative viewpoint, disclosing the nature of the issue.

One of the most striking features of slum community is their social relations. There are different paths had been selected to consider on social profile of this community. It was measured their wellbeing through talk about social relations, mental health issue, vulnerable behaviour, and political relationship. At the broadest level, the slum dwellers develop a sub- culture which is clearly distinguishable from the focal culture. They have their own mode of life, and different patterns of social relationships.

Conclusion

Poverty being the principal characteristic of the discussed communities, as the first and foremost step its indispensable to eradicate the persistent poverty culture pertaining to them. Setting up community development councils to give the people the knowledge, the skills and the voice to help them transform the conditions and services in the settlements in which they live is another significant step which should undoubtedly be taken into consideration. Through participatory decision making and community empowerment, people will be given the knowledge, and the voice to transform the conditions and services in these settlements. It is crucial that the government should create a progress to change the image and the perceptions of the slum inhabitants, also by implementing attitude changing programmes. Therefore, it could be notified that it's principally the poverty culture, and the embedded perceptions, the influence of urbanization and the lack of a solid governmental structure, lack of transparency which hinder an essential growth of these communities. Thus, a keen attention should be drawn on these aspects to create a difference, by uplifting their social standards.

References

1. Davis, M. Planet of slums. Retrieved October 6, 2020, from <https://www.amazon.com/Planet-Slums-Mike-Davis/dp/1784786616>
2. "Study of Slums as social and physical constructs: challenging and emerging research opportunities." 22 Sep.2016. Web. 14 December 2019
3. Sevanatha. "The Case of Colombo, Sri Lanka." 15 Oct.2016. Web. 5 December 2019
4. Subasinghe, Wasantha. "Quality of Life study on Slum Dwellers". 10 Mar.2015.
5. "Improving livelihoods of the urban poor". 2004. Web. 11 December 2019

A unified legal system for a diverse community: A critical analysis

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Abstract

Sri Lankan judiciary has been facing challenges while implementing precedence and handling disputes due to the nature of its legal system. Incomprehension of the personal laws has led the general public to react adversely against different communities based on their respective ethnicity or religion. Therefore, the concept of 'One Law One Country' is being emphasized by journals and experts to eliminate the issues arising among people while improving the function of the judiciary and the general law. This research will be dealing with the issues existing due to the lack of knowledge of the people regarding the different communities and the prevailing legal system. Thus, suggestions for the improvement of the existing legal system will be analysed. Further, social values, essential improvements on human rights and humanity will be discussed in order to emphasize the necessity of maintaining unity, equality and respectability when establishing one law for the entire nation.

Author Keywords

Legal system, Judiciary, Precedence, Personal Law, General laws

Introduction

Sri Lankan legal system is influenced by several laws due to the presence of different communities. The existing legal system is a combination of general law and three personal laws. The general law is compiled by the Roman Dutch Law and the English law, while the prevailing personal laws are Kandyan Law, Thesawalamai Law and Muslim Law. Despite this International Law and Treaty laws have influenced in the legal system. The 'One Law One Country' campaign is being focused mainly after examined disputes between the religious communities and adverse observations and different perspectives of each society towards the unique functions of personal laws. (Shanti & Menaka, 2006)

Literature survey and interviews

Surveys and interviews are done to analyze about the campaign 'One Law One Country'. Therefore, we discovered both supportive and against arguments regarding the concept. Interviewing experts and analyzing the objectives of the people were done through surveys to discover peoples 'perspectives towards emphasizing one improved law without personal laws.

Accordingly, there are supportive arguments as follows: we Sri Lankans, are all equal before the law; then why separate law to govern each community? Sinhalese and Tamils

are one and same but Muslims maintained an exclusion, a separate sharia court without any supervision or regulation or transparency of administration of Justice, difficulties exists in determining land, divorce and custodial disputes, comprehensive marriage systems are emphasized in general laws than personal laws, statutory Rape, supremacy of Constitution and fundamental rights and wrongful understanding of people towards the personal laws. Therefore, One Law is essential to maintain the Sri Lankan Identity. (Ananthavinayagan, Tamil, 2019).

Further, there are criticisms for the concept as follows; primarily Sri Lanka is a Democratic Socialist Republic, pluralism is one of the core values of democracy, however it has faced several challenges such as, 30 years of Emergency; It is proven that we are for Nothing but other than Democracy, judiciary is well respected given the pity criticism; Constitution is always upheld by supreme court, right thinking educated/ wise people still have a louder voice and trouble makers earned less reputation and respect, Sri Lankan has rich Legal History and Legal system, Muslim Personal Law (MPL) only for Marriage, Divorce and Maintenance, there is already a Civil Law is available. Muslim law of Wakf or Endowment (Marsoof, S. (2019), Buddhist Ecclesiastical Law of Buddhist Temples and Temporalities and the Article 16 of the (Constitution. of Sri Lanka, 1978)

Methodology

This research was conducted through primary data collection techniques such as likert scale and the chosen population is the residents of greater Colombo region. Further the survey was distributed among the samples using snowball sampling method.

Hence, scholarly literatures were collected related to the relevant issues throughout the research. These literatures were analyzed and filtered by identifying the articles which were providing the solutions for the issues.

A focused group of people, such as who are governed, well-versed and practicing the general law and personal law were respectively interviewed. As a result, the issues and opinions of different groups of people were heard and taken into consideration regarding the law of Sri Lanka. Thus, it led the most suitable path for this research to form the conclusion of establishing one law for the entire nation while protecting the human rights and improving unity among different communities.

Results and Conclusion

Majority of the respondents declared as they are willing to be governed by one law due to their personal experiences and the above specified supportive arguments. Furthermore, according to experts' opinions a democratic nation is possible to be achieved with an improved legal system and people with unified nature, dignity and equal approach.

References

Wijesinghe, Shanti & Lecamwasam, Menaka. (2016). The legal system of Sri Lanka.

Ananthavinayagan, Thamil. (2019). Sri Lanka's Human Rights Infrastructure.
10.1007/978-981-13-7350-3_3.

Marsoof, S. (2019). "One Country - One Law" in the Context of Sri Lankan Matrimonial Law. Meezan 53rd Edition.

The Constitution of the Democratic Socialist Republic of Sri Lanka 1978

Prisoners right to be free from torture: A critical analysis

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Abstract

The paramount purpose of this study was to investigate the freedom from torture not being guaranteed for prisoners and also in order to identify if it achieves retribution, deterrence, incapacitation and reformation and how torture taking place inside the prisons, and observe how far the lawyers, judges, police officers and prisoners are aware of this quantitative and qualitative approaches were used by the researcher to collect the views and gather information's regarding torture inside the prisons. The researcher aimed to identify the current position of torture in the country and based on the literature review, it is evident that Sri Lanka has increasing rate of torture. One theme that emerged from the result of the quantitative data analysis was the prisoners demand to stop the torture inside the prisons. In examining the torture practiced, it was apparent through the respondents and participants that they showed much preference to prevent the torture. The findings also suggests that the torture is not morally acceptable and it will affect the society. Despite Sri Lanka voting some of them are favour of the torture and some of them are against to the torture. The view of the each person contradictory to others.

Keywords

Freedom, Prisoners, Torture, Prisons

Introduction

Torture is a crime according to all international standards. According to the United Nations Convention Against Torture 1984. Torture means any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person for such purposes as obtaining from him or a third person information or a confession, punishing him for an act he or a third person has committed or is suspected of having committed, or intimidating or coercing him or a third person for any reason based on discrimination of any kind, when such pain or suffering is inflicted by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity. It does not include pain or suffering arising only from, Inherent in or incidental to lawful sanctions.

The historical documents of Ceylon mention 32 methods of torture practiced by the kings. When Ceylon came under British colonial rule in 1815, the British Governor signed the Kandyan Convention with the native leaders. Considering the acts of torture practiced by the Sinhala monarch, the convention stated that 'Every species of bodily torture and all mutilation of limb, member or organ are prohibited and abolished'. For example, before the House of Commons Committee on Ceylon 1849/50, it was reported that a lieutenant hung the Kandyan prisoners without any trial, and particularly relished having them hung up outside his quarters, while he had his breakfast!

The 1978 constitution of Sri Lanka also states that "No person shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment". In 1984, United Nations approved the 'Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment' in 1984.

Background / Literature Survey

McCoy's *A Question of Torture* is part of The American Empire Project which seeks to examine the origins of US imperial aspirations, and analyze their effects at home and abroad. The book came out in the aftermath of the Abu Ghraib torture scandal that emerged in April, 2004 when CBS News broadcast them to their audience. Images of prisoners being chained in uncomfortable positions, with underwear soaked in urine covering their faces; with feces smeared across their bodies; leashed and forced to crawl on the floor; intimidated by dogs; forced to form human pyramids while naked and having their heads covered; sat on by the US forces, or hung upside down for hours horrified, and will forever horrify, many. The victims will, however, never recover.

The current review critically examines the body of torture research focusing on the definition and operationalization of the primary construct. Almost three-quarters (69.9%) of the studies reviewed did not reference any definition of torture. Few studies identified important contextual variables related to defining torture such as identities and motivations of perpetrators and severity of abuse.

Vol 29 No 1 (2019): *Torture Journal: Journal on Rehabilitation of Torture Victims and Prevention of Torture*. Torture has been used throughout history for interrogation, coercion, and punishment. Ingenious methods have been devised to inflict severe physical or mental pain or suffering intentionally on an individual to obtain a confession or information, or to punish, intimidate, or coerce. Nowadays, torture is prohibited under international law and under the domestic law of most countries, and is considered to be a violation of human rights.

Research Methodology

Research design is defined as a framework of methods and techniques chosen by a researcher to combine various components of research in a reasonably logical manner so that the research problem is efficiently handled. There are three main sections of research design: Data collection, measurement, and analysis. This study focuses on human behavior towards the implementation of the torture, why it is so and how it is justified. The research approach used is therefore a mix of qualitative and quantitative, explanatory and descriptive.

Results and Discussio

10 Questionnaire were distributed among 40-50 years old grouped prisoners' category 1 and 5 questionnaires were distributed among Polices and Lawyers category 2 and 3. All questionnaires were answered and returned and used for interpretation. 20% of the questionnaire given to 35- 50 year olds were answered by female respondents and 80% by male respondents. Data gathered from questionnaire were analyzed based on frequency counts. This means that responses to each question from the participants were added together to identify how frequent an answer was chosen. The quantified respondents' replies are presented in percentage and the researcher uses graphs and

charts as an aid to interpretation. The researcher had distributed the questionnaire to three categories of people to find out the responses between prisoners, polices and lawyers were similar or different.

Conclusion

This research studies the applicability of the Torture and the effects it has on society. One area of further research would be compare the torture rates in the country in the past decade and look in to the reasons why these torture were committed in order to minimize the crimes rates in the county. The torture rate rapidly increasing although prevention steps taken by government. There are a vast number of documented cases, and the failure to prosecute them clearly indicates a lack of will on the part of the judiciary. Impunity is directly attributable to the entire criminal justice system, and particularly to the judiciary.

Accordingly to the lack of access to counsel is normative gaps in the rights of criminal defendants, as the Code of Criminal Procedure Act, worryingly, does not stipulate the right of a defendant to legal representation. However, in 2012, the Police Appearances of Attorneys-at-Law at Police Stations Rules came into effect, which recognize the right of a suspect to legal representation at a police station starting immediately after arrest and during detention. The Special Rapporteur regards this as a positive development that should be implemented more widely in practice.

The Special Rapporteur shares the concern of the National Human Rights Commission over the recently proposed amendment to the Code of Criminal Procedure Act, which, contrary to international human rights standards, denies a suspect access to a lawyer until his or her statement has been recorded, thereby eliminating any safeguard against torture and ill-treatment and defeating the Code's very purpose, and also impinging on the fundamental right to a fair trial as guaranteed in article 13 (3) of the Constitution.

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References

Assessing the Effectiveness of National Human Rights Institutions; Richard Carver, International Council for Human Rights Policy; 2005.

Bennett, R. (2007). Endorsement by the seminar military interrogators. *Peace and Conflict*, 13, 391– 392. <http://dx.doi.org/10.1080/10781910701665543>.

Costanzo, M. A., & Gerrity, E. (2009). The effects and effectiveness of using torture as an interrogation device: Using research to inform the policy debate. *Social Issues and Policy Review*, 3, 179– 210. <http://dx.doi.org/10.1111/j.1751-2409.2009.01014.x>.

Dershowitz, A. (2010). Dershowitz: Torture could be justified. Retrieved from <http://ed.cnn.com/2003/LAW/03/03/cnna.Dershowitz/>

A study on the importance of community awareness to strengthen the self esteem of the HIV patients through eliminating discrimination

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Abstract

The HIV is being considered as a pandemic by the author since it spread all around the globe while being considered an epidemic by the World Health Organization (WHO). Ever since the first HIV (Aids) case was registered in 1981 it has been considered as a controversial disease among different societies. Accordingly, a proper knowledge and understanding was acquired through institutions and organizations regarding symptoms, causes and treatments. However, the general public always misunderstood the natures of this disease. 'HIV Aids' and the knowledge acquired had been rather infective in curbing the spread in most of the nations. Though, the UN regulations and Human Rights principles are protecting the infected in different ways, it is still considered a controversial topic due to pre existing social biases and principles, infected are being treated adversely under several circumstances. Further, most of the developed nations also, reflect this behavior due to the lack of knowledge, understanding, education and insufficient regulations to address HIV infections. As a consequence, the infected are suffering from devastating behaviors of such people. Therefore, this research will provide recommendations and suggestions to improve the comprehensive knowledge among societies filled with misconception regarding HIV in order to strengthen the self-esteem of those affected by HIV and to create awareness among people.

Keywords

Human Rights, HIV Aids, Pandemic, Norms, Symptoms, Causes

Introduction

The human immunodeficiency virus HIV is considered a public health issue and approximately population of 38 million infected around the world. Men who have sexual intercourse with men, people who inject drugs, prisoners who survive in undeveloped places, transgender people and sex workers and their clients are considered as at high risk of getting infected. Further, the infected rarely realize their disease with symptoms and they observe symptoms or an influenza-like illness including fever, headache, and rash or sore throat at later stage. Following the weakness of immune system, they realize swollen lymph nodes, weight loss, fever, diarrhea and cough. Without treatment, they could also develop severe illnesses such as tuberculosis (TB), cryptococcal meningitis, severe bacterial infections, and cancers such as lymphomas and Kaposi's sarcoma (AKM Ahsan., 2011).

Subsequently, causes of the disease are being considered more problematic while considering social standards. It transmits from different elements of infected persons such as, blood, breast milk, semen and vaginal secretions. Further, several additional risk factors are also contributing the spread of this disease. However, it does not spread

through ordinary behaviors of persons as follows, hugging, shaking hands, or sharing personal objects, food or water (Patankar & Pandit, 2014)

Literature survey and interviews

The literature survey is done to find the misconception regarding HIV and what should be done to create awareness in the society to prevent discrimination. As per the literature survey it is found the perspective of general people regarding HIV patients, social causes for HIV Aids and what knowledge must be provided to eliminate this discrimination. Many societies consider the HIV infected patients as people who lived immoral lives with improper behaviors, due to the lack of knowledge. They are treated in a disrespectful manner and kept in isolation. Therefore, an HIV infected persons' self-esteem is challenged with insufficient understanding of general people (Fatemeh, Farzaneh, Forough & Mohammed, 2017).

This indicates the failure of the society in preserving human rights. Though, people know that HIV spread through blood and sexual intercourse, it is not always necessary to be a cause. It changes depends on each case. Accordingly, defaming a person's personality or character based on the reason that the person is infected by HIV is unjustifiable. In USA 85% of the people have reported that they feel uncomfortable to live or work with AIDS infected patients. Therefore, most of the people are being discriminated based on this misconception (Cynthia & Britten, 2010)

Consequently, HIV testing services and prevention methods were suggested to prevent it from spreading. Accordingly, the WHO also made recommendations to provide lifelong ART to people who live with HIV and it also has adopted by more than 185 nations. Furthermore, it implemented "Global health sector strategy on HIV for 2016-2021 to emphasize strategic directions to be followed in infected nations. Therefore, it is determined that The UN and The HR commission have played a vital role in providing support for the HIV infected since the HR regulations are also addressing them and entitle them to enjoy their fundamental right (World Health Organisation, 2020).

Some of the governments have implemented certain policies to protect such discriminated people. The Chinese government has already issued a set of laws and policies to protect the legal rights of people living with HIV. These include the Act on the Prevention and Treatment of Infectious Diseases (2004), the Regulation on the Prevention and Treatment of HIV/AIDS (2006) and the Tort Liability Law of the People's Republic of China (2010) (Yin, Wenyuan & Couzin, Odilon, 2019)

Therefore, it is found that mainly general people believe that gay and bisexual are getting affected from HIV since they engage in high sexual practices. Regardless of that there many victims of sexual assault, childhood trauma, rape and threats are also causes which may lead people get involved in sexual practices. Accordingly, this misconception must be addressed by institutions and societies to make a transformation in the society. Therefore, this research emphasizes that awareness should be created through providing sufficient knowledge regarding social reasons of HIV and consequences of affecting the self esteem of HIV patients while implementing measures to protect them since the cause of discrimination is inherently existing in the society.

Interviews and theoretical prepositions

This research is made with qualitative data through journals and interviewing doctors directly about HIV and its infected patients. Further, social activists' opinions and reports with publications of institutions are also analyzed to justify the conclusion of this research. The disease is analyzed with a significant literature survey.

Methodology

The research is including journals, opinions of scholars, authorities, and summary interviews of relevant sources as a qualitative research. Mostly, scholarly literatures were collected related to the relevant issues throughout the research. These literatures were critically evaluated by recognizing appropriate publications which explained solutions for identified misconceptions.

Results and Conclusion

As a conclusion of the methodology, it is discovered that not all infected people had immoral behaviors. Further, most of the people are not educated with basic education of HIV Aids which is a growing pandemic. Therefore, it is essential to provide basic knowledge regarding the disease to public of moralist societies since it is a prior responsibility of humans to respect humans through accepting them as they are.

References

Fair, Cynthia & BA, Britten. (2010). HIV-Related Stigma, Discrimination, and Knowledge of Legal Rights among Infected Adults. *Journal of HIV/AIDS & Social Services*. 9. 77-89. 10.1080/15381500903583470.

Ullah, AKM Ahsan. (2011). HIV/AIDS-Related Stigma and Discrimination: A Study of Health Care Providers in Bangladesh. *Journal of the International Association of Physicians in AIDS Care* (Chicago, Ill.: 2002). 10. 97-104. 10.1177/1545109710381926.

N, Patankar & D, Pandit. (2014). Study of HIV/AIDS related stigma and discrimination in people living with HIV AIDS. *Journal of Research in Medical and Dental Science*. 2. 53. 10.5455/jrmds.20142410.

Oskouie, Fatemeh & Kashefi, Farzaneh & Rafii, Forough & Gouya, Mohammad. (2017). Qualitative study of HIV related stigma and discrimination: What women say in Iran. *Electronic Physician*. 9. 4718-4724. 10.19082/4718.

Oduro, Gina & Otsin, Mercy. (2012). Perspectives on HIV/AIDS stigma and discrimination: Voices of some young people in Ghana. *Sex Education*. 13. 1-13. 10.1080/14681811.2012.678941.

Yin, Wenyan & Couzin, Odilon. (2019). HIV-Related Stigma and Discrimination in China. 10.1007/978-981-13-8518-6_28.

Lessons from ebola to fight corona virus

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Abstract

Pandemic is referred as an element or disease which significantly affects people through transmitting from one area to another area. The globe has faced many pandemics from past centuries. However, the Covid19, which is officially known as SARS-CoV-2 is a deadly and highly contagious pandemic. It has caused approximately 1,699,560 million deaths and 77,169,391 million Corona virus cases around the world in December 2020. The highly facilitated world which has overcome significant pandemics, Plague, SARS, Spanish Flu, and Ebola is facing difficulties in preventing Covid 19 from spreading. It is determined based on the fact that it has spread throughout the world though it formed in China beyond the boundaries of all nations. This research is mainly focused on analyzing the case study of "Ebola" (Ebola haemorrhagic fever), the pandemic which outbreak firstly in West Africa, in 1976 reported 12,000 deaths and 29,000 cases around the world. Reportedly, Ebola still exists after the second outbreak in 2014, though; it is prevented from spreading through strict rules and systematic measures. Therefore, this is a comparative research to provide a winning formula to prevent Covid 19 from spreading around the world with recommendations, suggestions and measures to overcome Covid19.

Author Keywords

Pandemic, Contagious, Ebola, Transmission, Covid 19, Corona viruses

Introduction

Ebola virus was discovered in Congo near Ebola River in 1976, it was identified as transmits from animals to human and spread among them. Accordingly, the largest Ebola outbreak happened from 2014 to 2016 in West Africa. Subsequently, the public was adversely affected in 2018 due to complicated situations (Saeed, Negar Samaneh, Sepideh&Seyedahmad,2015). The Symptoms of the disease are, fever, fatigue, muscle pain, headache and sore throat. Most of the journals have recognized quarantine, Outbreak containment measures, special caring towards Pregnant and breastfeeding women, a good laboratory service, proper healthcare regulations with protective environment, caring people who cured from (EVD), safe and dignified burials, rVSV-ZEBOV vaccinations and social mobilization as suitable measures to overcome Ebola (World Health Organization, 'Ebola virus diseases'2020). However, there is no proven treatment to cure the Ebola viruses. The drug therapies and symptomatic treatment are being developed presently while following other measure to prevent it from spreading strictly (Bonilla, César. (2015). Though, the spreading of disease is not controlled completely, it is still being prevented from spreading with the aforesaid measures in order to reduce the death rate in infected countries.

Literature analysis and interviews

Further, according to the literature analysis, import, export, customs and tourism are also affected hence the airports are closed to prevent Covid-19 from spreading. Further, some developing nations and non-developed countries are also facing issues in providing food to the citizens with the absence of self-sufficiency and due to closed market which was caused as a consequence of Covid-19. Therefore, this article will emphasize on how far is it possible to prevent Covid-19 while protecting all the people with the above specified measures based on the case study of Ebola (Saman, Piumi, Upuli, & Indu2020).

WHO has recognized Sri Lanka as one of the countries that prevented Covid-19 in a better manner. According to that most of the journals have recognized quarantine, herbal medicines, isolation, social distance and lockdown as suitable measures to prevent corona from being spread (Wickramaarachchi, Tharindu & Perera, Sanjeewa & Jayasinghe, Saroj, 2020). However, it is determined that the spreading of disease

could not be controlled since the second wave of the disease has begun and Covid-19 was spreading again throughout the nation. Most of the countries have faced economic instability since the functioning of trade is shuttered with restrictions on imports and exports to prevent corona virus from spreading (World Health Organization, 'Covid 19 2020).

Further, if the systematic approach which is utilized during Ebola such as quarantine, Outbreak containment measures, special caring towards Pregnant and breastfeeding women, a good laboratory service, proper healthcare regulations with protective environment, caring people who cured from (EVD), safe and dignified burials and social mobilization might have followed then the eruption of second wave of Covid 19 in Sri Lanka could have been avoided.

However, comparing with western nations such as America and UK, Sri Lanka has been controlling the death rate and still curing number of patients rapidly. 67,401 deaths occurred in UK, 325,00 in USA while 176 deaths in Sri Lanka. This shows how Sri Lanka is managing control the disease though with the presence of 650, 610 square feet land area, less facilities, descent population, less health sector, economic instability and lack of self sufficiency. Though, it faces economic instability and issues regarding maintaining self sufficiency as a developing nation, it is still functioning effectively than developed nations to fight against Corona (Manawadu, Lasantha & Wijeratne, Sandamali, 2020).

Furthermore, in countries like India a proper healthcare system was not utilized and they were not safeguarded with sufficient measures. Therefore, most of the doctors got infected and some of them died eventually. Accordingly, they must be protected as being followed during Ebola. Even a special care towards pregnant ladies could have been provided since most of the infants died due to Covid. Accordingly, the quarantine process could have been done systematically by isolating a particular place more than preferring lockdown initially as being followed in Sri Lanka now in order to stabilize economy (Suranga & Silva, D.A.C., 2020). Implementing measures to make awareness among people to utilize healthcare to create protective environment.

These facts indicate that though countries are aware of winning formulas to be followed

during pandemic based on previous studies, those have not implemented successfully. Therefore, even if countries emphasize that people should learn to live with Covid 19, it could be achieved by only utilizing the lessons we learnt from previous experiences.

Sensory calculation, multiple sources of evidence and theoretical prepositions

According to the statistics and journals as a secondary research, possibility of curing or preventing the disease with the aforesaid methods are discussed with problematic concepts such as self-sufficiency, economic instability, lack of knowledge of people regarding the disease, ineffective implementations of national governments to protect the people.

Statistics to represent death rate, survival rate and registered cases are also used in the research to compare both Covid19 and Ebola. Therefore, significant articles and reports of authorities are also used to make this comparative research.

Methodology

This research is made with both qualitative and quantitative data by analyzing the case study of Ebola. Furthermore, journals and scholars of authorities, WHO, statistics to represent the death rate, infective and cured and mostly examples of measures to be followed are discussed with evidences, real incidents and experiences to justify the conclusion.

Results and Conclusion

With regards to those discussions it is found that similar methods were used before to prevent and overcome pandemics in previous centuries while the prevailing circumstance is considering challenging due to some social changes, the development of all sectors, negligence of people and failure to utilize past experiences.

The human history has evident how they have discovered solutions for contemporary problems from past experiences. Accordingly, this case study emphasizes about utilizing such lessons effectively to fight pandemic. Therefore, it is discovered eventually that Covid 19 is preventable as other diseases which were overcome by the world with proper implementations as planned.

References

- World Health Organization, 'Ebola virus diseases' 2020
Available at <https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease>
- Moghadam, Saeed & Omid, Negar & Bayrami, Samaneh & Moghadam, Sepideh & Seyedalinaghi, Seyedahmad. (2015). Ebola viral disease: A review literature. Asian Pacific Journal of Tropical Biomedicine. 210. 10.1016/S2221-1691(15)30341-5.
- N B, Thippeswamy. (2015). EBOLA VIRUS DISEASE.
- Escobedo-Bonilla, César. (2015). A review on the Ebola virus, outbreak history and the current research tools to control the disease. Journal of Coastal Life Medicine. 3. 10.12980/JCLM.3.201514J81.
- Kimura, Hirokazu & Tsukagoshi, Hiroyuki & Ryo, Akihito & Oda, Yoshiro & Kawabata, Toshinobu & Majima, Takashi & Kozawa, Kunihisa & Shimojima, Masayuki. (2015). Ebola virus disease: a literature review. Journal of Coastal Life Medicine. 3. 10.12980/JCLM.3.201514J93.
- Manawadu, Lasantha & Wijeratne, Sandamali. (2020). COVID-19: COULD NEW CORONA VIRUS INFLICT MORE PAIN ON SRI LANKAN ECONOMY.
- Nanayakkara, Saman & Nakandala, Piumi & Nakandala, Upuli & Nanayakkara, Indu. (2020). A Review on COVID-19: A Global and Sri Lanka Perspective. 2. 63-70.s
- Silva, Suranga & Silva, D.A.C.. (2020). Sri Lanka: Victory Against the COVID 19: Get Ready for Hardworking to Make the Country Better.
- Wickramaarachchi, Tharindu & Perera, Sanjeewa & Jayasinghe, Saroj. (2020). COVID-19 epidemic in Sri Lanka: A mathematical and computational modelling approach to control. 10.1101/2020.04.21.20073734.

A systematic review on modern recruitment strategies: A qualitative study

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Abstract

Better recruitment strategies result in improved organizational outcomes. With reference to this context, the research paper entitled explore modern Recruitment based on exiting sources. Selection has been prepared to put a light on Recruitment and Selection process. The main objective is to identify contemporary recruitment sources and to examine the modern strategies for recruitment in organization. Successful recruitment and selection practices are key components at the entry point of human resources in any organization .The study also focus its attention to determine what the modern recruitment practices available are and provide some suggestions that can help for organization and needy people. Non probability sampling has been used for this study, purposive sampling method is selected and 15 articles are used for this study. Data analysis has been done with thematic way by using PRISMA Approach. Based on this study modern key recruitment strategies identified: E-recruitment, Application of equality, Online based recruitment system ,Social media recruitment (Facebook), Psychological assessments, E-HR mechanisms ,Recruitment through Corporate websites, AI-based recruitment system, Applicant Tracking Software (ATS) and Professional networks (LinkedIn).

Keywords

Recruitment, AI: Artificial Intelligence, Social media Recruitment, E-HRM

Introduction

The quality of the recruitment strategies and techniques influence to select the right person, for the right position at the right time. Even today many companies are still using traditional recruiting through newspapers. Apart from that, use of employment exchange boards, employee referrals, online job portals are also used. However, these recruit methods are still adequate to hire the right candidate. But when considering current scenarios in the world, recruitment methods have been changed with the diffusion of internet technologies. Today, technology plays a critical role in recruitment; that supports to not only apply for jobs easier but also it facilitates to find qualified candidates anywhere in the world (Sambamoorthy, 2019).

The research objectives were set as;

- To understand the Existing Recruitment sources and Explore modern recruitment sources in any organization

Main research question

- What are the modern recruitment strategies used by the organizations?

Background and theoretical underpinning

Modern Recruitment Strategies

The recruitment strategy connects all important recruitment components and HR components, as the organization realizes its strategic goals. The recruitment strategy defines the unique mix of position of the organization on the job market, recruitment channels to be used for attracting candidates, recruitment style of the organization, differentiators from competitors on the job market, recruitment processes and procedures and recruitment metrics. The business strategy is a key document, which drives everything in the organization. HR strategy governs the HR management approach in the organization. The recruitment strategy defines the basic recruitment processes and procedures. The modern recruitment tool mainly uses not only hiring people into organization but also selection of talent. Currently, organizations concern online recruitment tools or recruitment software to demonstrate the innovational inside within the organization. Results of this kinds of innovative recruitment methods, management can highlight every steps of the recruitment process. Referral policy, referral systems, social media recruiting tools and onboarding are other additional tools of the effective recruitment process. With changing the world, organization can base modern recruitment techniques and tools over 24 hours to raise hiring game of recruiters and managers (Solek-Borowska and Wilczewska, 2018)

Methods of analysis

This study will be qualitative since it will be based on secondary data and analyze the data through qualitative methods such as PRISMA model and thematic analysis. Further, the current study will be deductive. Deductive approach is based on existing theories and findings therefore, no new concepts or theories will be generated. The researcher will select 15 journal articles from reputed research publication websites such as Research Gate and Emerald Insight via random sampling. Moreover, the researcher will select the latest research articles which have been published during 2010 to 2020 for enhancing the relevancy of the information (Langkos, 2014).

Significance

A large number of studies have been conducted around the field of recruitment and selection, but they did not focus on the modern strategies for recruitment in organizations. Hence, there is a knowledge gap on the modern strategies for recruitment in organizations. Present study will be committed to address the research gap and it has summarized the 15 research articles regarding modern recruitment strategies. Thus, a reader can gain sound knowledge through the findings of this research.

Overall conclusion

In the data analysis; Use of technology, E-recruitment, Application of equality, Online based recruitment system, Social media recruitment (Facebook), Psychological assessments, E-HR mechanisms, Recruitment through Corporate websites, AI-based recruitment system, Applicant Tracking Software (ATS) and Professional networks (LinkedIn) has been identified as modern recruitment strategies.

Recommendations

In the data analysis, several data analysis methods have been identified and it is

recommended to implement those strategies with the consideration of cost, priority, and responsibility. Moreover, recruitment strategies should be updated with the time and according to the changes in the external environment. The external environment analysis should be conducted to determine the latest trends of human resources management. Moreover, benchmarking should be conducted to compare the recruitment strategies of the organization with the other organizations and adjust the current strategies of the organization to the maximum level.

References

- Almeida, F., Faria, D. and Queirós, A. (2017) 'Strengths and Limitations of Qualitative and Quantitative Research Methods', *European Journal of Education Studies*, 3, pp. 369–387. doi: 10.5281/zenodo.887089.
- Azmy, A. and Abeng, T. (2019) 'RECRUITMENT STRATEGY TO HIRE THE BEST PEOPLE FOR ORGANIZATION'.
- Baykal, E. (2020) 'Digital Era and New Methods for Employee Recruitment', in, pp. 412–430. doi: 10.4018/978-1-7998-1125-1.ch018.
- Benders, J. et al. (2009) 'ERP-systems and job content: A case study of HR-assistants', *Personnel Review*, 38. doi: 10.1108/00483480910992256.

Strategically Learning from Covid 19: Public universities Sri Lanka

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Abstract

The main aim of this study is to explore the factors that affect on the implementation of the university system due to Covid-19 epidemic .

Most of the universities are struggling in teaching students due to this pandemic situation. This study focuses on the areas where Universities are failing and where they have to focus with a high emphasis in the future. This study is fully based on the secondary sources. The author adopted purposive sampling method under Qualitative study, and 15 newspaper sources has been used for this study. Based on data sources, thematic content analyses was done in the data analysis method. Key findings of the study are; lack of enough Digital resources and infrastructure facilities in the universities, Inadequate Digital Resources, Mobile and Laptop facilities among students. The overall coverage requirements could be summarized as Internet Facility and accessibility, Changes for Adaptation issues towards e-learning and modern methodology, inequality in rich and poor and re-thinking needed in the education system.

Keywords

Covid-19, Strategy, Re-Thinking, Digital Infrastructure, Qualitative study.

Background of this study and Literature Review

Firms which implement strategic planning have reached greater performances over the firms which do not implement such strategic planning; but most of the organizations fail in such strategies due to the problems and issues encountered in the stage of strategy implementation (Asutay, Dixon and Al-Kandi, 2013). Regardless of the presence of interpretations, there is no clear definition for implementations. Many studies have interpreted the implementation in a general way with the economic, social, psychological, and strategic management. Even though, there is a conceptual description of strategy execution by many authors, it lacks universal definition.

One of the hottest topics during this Covid-19 pandemic in the world now is strategic planning and strategic implementation. Due to the global economic crisis, every country is urging to merge and implement their economical conditions by using strategies. Therefore, strategic management became a necessity of each and every company, private and government institutions in a competitive and dynamic environment. The direction and the scope of an organization in the long term can be demonstrated as a strategy. The strategy directs the organization to achieve established goals while achieving competitive advantages in the dynamic environment through manipulating firm resources and competencies (Johnson, et al., 2008). The success of strategic management is the implementation of the planned strategies with the support of managers, administrators,

employees and their organizations' or institutions' culture. (Mišanková & Kočišová, 2014) If an institution has to see their success, its main operational task should be implementing strategies on their everyday operation. Therefore, it is important to define the strategy as a basic element in the institution to have the relationship between the planning, managing and implementing.

Open system theory explains that survival of the organizations is depend on its relationship with external environment and they are greatly influenced by the external environment (Kurendi, 2013). Organizations are being perceived as an open system where many actors exist and have mutual relationship while interacting with each other (Kurendi, 2013). At many levels of the organizational process particularly at input, process and output external environment is involving by providing resources and absorbing outputs of the company (Waithaka & Waiganjo, 2017). Importantly in strategy management, formulation and implementation of strategies should be shaped with the changes of the environment so that successful strategic achievement can be obtained (Pearce & Robinson, 2011). Present study exploring strategical learning from covid situation in public universities in Sri Lanka.

Findings

Source: (Author Compilation)

Discussion

Lack of technological infrastructure in the country has become another barrier for strategic implementation for Sri Lankan universities. Due to the Corona 19 outbreak, universities don't have the possibility of holding lectures and classes for students. As a solution for this, foreign universities are successfully adopting the online learning methods through Zoom and Skype. Researcher has observed that some Sri Lankan universities also implementing the online learning methods for students. However, due to the lack of technological infrastructure of the country, this method was not much effective. All the university students in Sri Lanka do not have smartphone.

Number News sources Learning

1	Daily Mirror	We are Lacking in Digital resources
2	Daily Fit	Inadequate Digital Resources :Mobile and Laptop facility
3	Daily News	Data Coverage: Internet Facility and accessibility
4	Daily Fit	Change: Adaptation issues toward E learning and Modern method
5	Daily News	Inequality in Rich and Poor
6	Daily Fit	Re Thinking Toward education system

Source: (Author Compilation)

Discussion

Lack of technological infrastructure and laptops. Even they can share a friend's device for study purpose, internet signal coverage is not available for some areas in Sri Lanka. Then, even though students are having required devices, they cannot participate for

online learning due to lack of technological infrastructure in the country. Therefore, technological infrastructure in the country can be considered as another issue of strategic implementation of Sri Lankan universities (Daily News, 2020).

The free public education system is primarily introduced to uplift the educational opportunities and benefits for students who come from economically marginalized families. These traditional classrooms consist with the students from different economic and cultural backgrounds to a common, shared space. However, spread of Covid-19 throughout the country has limited physical distancing for weeks may be months. In this regard government has restricted classroom education and introduced the online education for students. However, this online education makes hard students who do not have enough economic wherewithal to access the necessary equipment to connect with online platforms. Many people in our country struggle to access water, electricity, and other infrastructures; some families struggle to find money even for food. In such circumstances, how those people purchase internet data for their student's education. Also, most of students do not have favorable learning environment within their homes. So, it is obvious Covid-19 has widened educational inequalities in Sri Lanka. If, online education is the only effective way for students, government should eliminate the cost for both students and teachers, otherwise this may lead to create considerable educational inequalities between the rich and the poor (Daily FT, 2020).

The classroom is not just a place for learning, it is the primary place for students to interact with one another beyond economic or cultural boundaries so that building lasting bonds and friendships. Although, hotbeds of ragging and narrow nationalist politics have promoted by Sri Lankan university system, there were also some legitimate struggles too. Majority of students and teachers have raised their voices against the privatization of education. The actions taken by today may lead to feed again such struggling topics. Thus, people need to appreciate the role of such traditional classrooms towards when creating sense of equality among students. Therefore, it seems that pandemic urges or disasters like Covid-19 have provided opportunity to rethink about the assumptions on free education. It is obvious that if we move to online education, inequalities we already have will go up. Thus, this pushes us to rethinking on the ways in which students' feelings participation on conventional classrooms can be enhanced. The students' participation depends upon number of factors such as nutrition they can afford, the chance available for them to read, do homework, participation in recreational activities and the transportation facilities between home and university. The robust actions of the government lead to ensure the meaning of free education (Daily FT, 2020)

Conclusion

Environment is dynamic in nature. Organization has to focus changes in their strategic planning and implementation. Current study identified university has to focus digital infrastructure at high level. Covid-19 situation taught us we are far behind in digital world and digital resources mostly adopting new practices.

References

- Daily FT (2015) 'Technology, students and learning', Daily FT, 23 September, p. 1. Available at: <http://www.ft.lk/columns/technology-students-and-learning/4-474119>.
- Daily FT (2020) 'Learning lessons: The COVID-19 challenge to education', Daily FT, 15 May, p. 1. Available at: <http://www.ft.lk/columns/Learning-lessons-The-COVID-19-challenge-to-education/4-700218>.
- Daily FT. (2020, 02 20). Future of higher education and challenges for public universities in Sri Lanka. Retrieved from Daily FT: <http://www.ft.lk/columns/Future-of-higher-education-and-challenges-for-public-universities-in-Sri-Lanka/4-696015>
- Daily Mirror (2018) 'THE UBIQUITOUS UNIVERSITY PROBLEM', Daily Mirror, 18 August, p. 1. Available at: <http://www.dailymirror.lk/153954/THE-UBIQUITOUS-UNIVERSITY-PROBLEM>.
- Daily Mirror (2019) 'Sri Lankan higher education system needs specific reforms: UGC Chief', Daily Mirror, 7 November, p. 1. Available at: <http://www.dailymirror.lk/features/Sri-Lankan-higher-education-system-needs-specific-reforms-UGC-Chief/185-177427>.
- Daily News (2020) 'Managing the impact of COVID-19 on education systems', Daily News, 25 March, p. 1. Available at: <http://www.dailynews.lk/2020/03/25/finance/215131/managing-impact-covid-19-education-systems>.
- DailyFT (2017) 'Dissecting the reasons for low international ranking of Sri Lankan State universities – A student's', Daily FT, p. 1. Available at: <http://www.ft.lk/opinion/dissecting-the-reasons-for-low-international-ranking-of-sri-lankan-state-universities-a-students-per/14-598248>.
- DailyFT (2019) 'Role of Sri Lankan academics in national policy development', Daily FT, 6 March, p. 1. Available at: <http://www.ft.lk/columns/Role-of-Sri-Lankan-academics-in-national-policy-development/4-674033>.
- Asutay, M., Dixon, R. and Al-Kandi, I. (2013) 'FACTORS INFLUENCING THE STRATEGY IMPLEMENTATION PROCESS AND ITS OUTCOMES: EVIDENCE FROM SAUDI ARABIAN BANKS', Journal of Global Strategic Management, 2, p. 5. doi: 10.20460/JGSM.2013715662.
- Johnson, G., Scholes, K., & Whittington, R. (2008). Exploring Corporate Strategy: Text and Cases (10th ed.). London: FT Prentice Hall Europe.
- Johnson G., S. K. (2011). Exploring Corporate Strategy: Text and Cases (10 ed.). Europe: FT Prentice Hall.
- Kurendi, G. A. (2013). Factors Influencing Strategy Implementation Among Flower Firms in Naivasha, Kenya (Unpublished MBA Project). Kenya: School of Business, University of Nairobi.

Mišanková, M., & Kočíšová, K. (2014). Strategic implementation as a part of strategic management. Elsevier Ltd. Retrieved from www.sciencedirect.com

Waithaka, M. M., & Waiganjo, E. (2017). FACTORS INFLUENCING IMPLEMENTATION OF STRATEGIC PLANS IN PUBLIC UNIVERSITIES IN KENYA: A CASE STUDY OF JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOG. *Intrenational Journal of Social Science and Information Technology* , 3(1), 1495-1502.

History of the reforms of sri lanka leading upto the Independence in 1948

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Abstract

Sri Lanka a multicultural and a multi-religious Island, is the home for a population of around 20 million and has undergone many changes in the political, economic and social spheres over the years. The coastal areas of Sri Lanka was first invaded by the Portuguese in 1505 and later by the Dutch, which ended in 1796 due to the handing over of the coastal areas to the British. These coastal areas were ruled by the British East India Trading company which had come into the East for trading activities. The coastal areas were governed by the Madras government and was placed under military officials. The British East India Trading company started levying heavy taxes in order to increase their income. And therefore the locals started a revolt against the British rule and their heavy taxes in 1797, but the British successfully suppressed the uprising in 1798. Thereafter the British government took over the control from the British East India Trading company. Therefore the trade was taken over by the East India Trade company and was controlled by one Governor, thus a dual system was present. Due to the failure of the dual system, Ceylon came under the British Empire through the Aemian Treaty signed in March 1802. The Britain only managed to set the Kandyan Kingdom under their rule through a treaty in 1815. Thus Ceylon became a colony of the British Empire in 1815. But the Ceylonese revolted against the British rule in 1818 and the British were able to successfully stop the 1818 revolution. Moreover the objective of the British rulers was to maintain Ceylon as a center to get raw materials for their productions and as a market for their productions. They continued a strict military government in order to achieve those objectives, but soon came across a great issue. The expenditure to maintain Ceylon as colony was higher than the income that was generated by her. And it was useless to maintain a colony with loss. Therefore W M J Colebrook was sent to investigate on the monetary base of Ceylon while D H Cameron was to investigate on the Judiciary side of Ceylon. Proposals were submitted by them in 1832 which was enacted in 1833. This research paper analyses the history of the Constitutional reforms of Sri Lanka which has landscaped the politics of this country and has also installed democracy. Colebrook who was a liberalist believed that socio – economic actions of the people should not be intervened by the government. His objective was not to grant economic liberation to the Ceylonese but to manage a capitalism to suit Ceylon in order to achieve maximum utility of the British entrepreneur class.

Keywords

Reforms, Constitution, Executive, Legislative, British

Research problem

Through the Reforms introduced to Sri Lanka by the British what major changes took place, Politically, Socially and Economically?

Introduction

W M J Colebrook established a capitalistic policy controlled by the government and made suggestions to stop all the feudal systems that didn't support his policy, whereas until 1833, all legislative and executive powers were exercised by the Governor of Ceylon, who was accountable to the Crown and carried out the instructions given from Britain.

Analysis

Colebrook Commission of 1833 introduced a legislative and executive council, while introducing racial representation in Ceylon and making a landmark in the constitutional history of Ceylon. Abolishing the Raja Kari system, uniting the up and low country, elimination of the government monopoly of the market, introducing the English education system, reduction of wages of civil servants, safeguarding rule of law and establishing a unitary judiciary system were the salient features of this commission. The reforms of this commission had adverse socio – economic and political effects some such being; emergence of an import – export economy, emergence of sub – industries and businesses, foundation was laid for a banking system and mobilization of labour force. Crew Mc Callum Reforms of 1910 raised up the constitution by providing an opportunity to appoint an educated local Ceylonese representative and therefore was termed as a constitution by some political critics. A financial working committee was established by the Governor at this time. However as there were many weaknesses a new constitutional reform was introduced in 1920 tentatively.

Through the Manning Reforms of 1920 the National Congress was formed and the franchise was further extended as being educated and having ownership of property. However the right to vote was granted only to a small fraction of the population. The increase of powers of the Governor and not granting a seat to the Tamils were major weaknesses and therefore a new proposal was made through Sir James Pieris.

The Manning Devonshire Reforms gave the Governor the power to implement laws and to protect the law and order with the consent of the Legislative council and most importantly for the first time representatives were chosen through public elections.

Donoughmore of 1931 enabled general elections with universal suffrage. The first time a country under the care of the British Empire observed the one-person, one-vote principle and was given the power to control domestic affairs. Universal suffrage meant that women could vote and therefore Ceylon became the first Asian country in which women voted at an election.

The Soulbury reforms of 1944 was drafted by D S Senanayake, which abandoned the Donoughmore Commission and formulated a model similar to the Westminster system practiced in UK. The main concern of minority representation was addressed through this reform by setting out electoral boundaries to fix constituencies in a new way to ensure that minority groups would secure more seats. The Soulbury reforms, ushered Dominion status and eventually granted independence to Sri Lanka in 1948.

Methodology

Qualitative research method has been adopted to carry out this research work. Sources such as Scholarly Articles, Research papers and Journal Articles have been used to

find data. The scope of this paper is to identify The History of the Reforms of Sri Lanka Leading upto the Independence in 1948.

Conclusion

After gaining independence in 1948, the country remained a commonwealth of the British Empire until officially proclaimed as an independent republic in 1972. This research paper discusses about the history of the reforms of Sri Lanka leading upto the Independence in 1948, which was introduced by the British and the major changes that took place in Sri Lanka.

References

Anon (n.d.) A Concise Constitutional History of Sri Lanka, [online] Available from: <https://roar.media/english/life/in-the-know/constitutional-history-of-sri-lanka> (Accessed 17 October 2020).

Anon (n.d.) Colebrook-Cameron Commission | British commission | Britannica, [online] Available from: <https://www.britannica.com/topic/Colebrook-Cameron-Commission> (Accessed 18 December 2020).

Anon (n.d.) Constitutional history of Sri Lanka, ConstitutionNet, [online] Available from: <https://constitutionnet.org/country/constitutional-history-sri-lanka> (Accessed 18 December 2020).

Anon (n.d.) Democracy, development and the executive presidency in Sri Lanka: Third World Quarterly: Vol 36, No 4, [online] Available from: <https://www.tandfonline.com/doi/abs/10.1080/01436597.2015.1024400?scroll=top&needAccess=true&journalCode=ctwq20> (Accessed 18 December 2020).

Anon (n.d.) Grasping at Straws: Judicial Review of Legislation in Sri Lanka in: ICL Journal Volume 13 Issue 3 (2020), [online] Available from: <https://www.degruyter.com/view/journals/icl/13/3/article-p281.xml?language=en> (Accessed 18 December 2020).

Anon (n.d.) I•CONnect – Three Key Constitutional Reforms for Sri Lanka, [online] Available from: <http://www.iconnectblog.com/2015/02/three-key-constitutional-reforms-for-sri-lanka/> (Accessed 18 December 2020).

Anon (n.d.) (PDF) Key Issues in Sri Lanka's Constitutional Reform Process: The Executive Presidency, Devolution and Bill of Rights. INSTITUTE FOR CONSTITUTIONAL STUDIES, [online] Available from: https://www.researchgate.net/publication/340681456_Key_Issues_in_Sri_Lanka's_Constitutional_Reform_Process_The_Executive_Presidency_Devolution_and_Bill_of_Rights_INSTITUTE_FOR_CONSTITUTIONAL_STUDIES (Accessed 18 December 2020).

Anon (n.d.) (99+) (PDF) The Donoughmore Constitution | Shifan Tariq - Academia.edu, [online] Available from: https://www.academia.edu/8866678/The_Donoughmore_Constitution(Accessed 18 December 2020).

Anon (n.d.) POST-INDEPENDENCE CONSTITUTIONS AND THEIR AMENDMENT PROCEDURES | Daily News, [online] Available from: <https://www.dailynews.lk/2019/04/09/features/182624/post-independence-constitutions-and-their-amendment-procedures>(Accessed 18 December 2020).

Anon (2017) Sri Lanka: Constitutional Reform Planned | Global Legal Monitor, web page, [online] Available from: <http://www.loc.gov/law/foreign-news/article/sri-lanka-constitutional-reform-planned/> (Accessed 18 December 2020).

Anon (n.d.) Sri Lanka - The Colebrooke-Cameron Reforms, [online] Available from: <http://countrystudies.us/sri-lanka/13.htm>(Accessed 18 December 2020).

Anon (n.d.) THE EVOLUTION OF SOCIAL POLICY IN SRI LANKA 1833-1970: THE BRITISH COLONIAL LEGACY on JSTOR, [online] Available from: <https://www.jstor.org/stable/23731388>(Accessed 18 December 2020).

Anon (n.d.) The Executive and the Constitutional Reforms Process in Sri Lanka: The Round Table: Vol 108, No 6, [online] Available from: <https://www.tandfonline.com/doi/abs/10.1080/00358533.2019.1688500?scroll=top&needAccess=true&journalCode=crt20> (Accessed 17 October 2020).

Carciumaru, R. (2019) Constitutional Reforms in Sri Lanka: From Majoritarian Control System to Integration and Accommodation?, In Including the Excluded in South Asia: Power, Politics and Policy Perspectives from the Region, Sekher, M. and Carciumaru, R. (eds.), Singapore, Springer, pp. 85–96, [online] Available from: https://doi.org/10.1007/978-981-32-9759-3_6 (Accessed 18 December 2020).

COLLINS, C. (1950) THE SIGNIFICANCE OF THE DONOUGHMORE CONSTITUTION IN THE POLITICAL DEVELOPMENT OF CEYLON, Parliamentary Affairs, IV(1), pp. 101–110.

de Silva, K. M. (1972) SRILANKA (CEYLON) THE NEW REPUBLICAN CONSTITUTION, *Verfassung und Recht in Übersee / Law and Politics in Africa, Asia and Latin America*, Nomos Verlagsgesellschaft mbH, 5(3), pp. 239–249.

Jayasuriya, L. (2001) THE EVOLUTION OF SOCIAL POLICY IN SRI LANKA 1833-1970: THE BRITISH COLONIAL LEGACY, *Journal of the Royal Asiatic Society of Sri Lanka*, Royal Asiatic Society of Sri Lanka (RASSL), 46, pp. 1–68

Jupp, J. (1970) The Constitutional System in Ceylon, *Pacific Affairs*, Pacific Affairs, University of British Columbia, 43(1), pp. 73–83.

Welikala, A. (2019) Constitutional Reforms in Sri Lanka – More Drift?, *The Round Table*, Routledge, 108(6), pp. 605–612.

Theoretical politics and applied politics: A comparison Study

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Abstract

Political Science studies the political behaviour of man. According to Aristotle the 'Father of Political Science', man is born as a political animal and from birth to death political actions influence him. In the past there was no difference between Political Science and Economics, it was combined and known as Politicoeconomic. During the 16th century we see the emergence of two terms as Politics and Political Science. There were many scientists who preferred using one of the terms; such as Jellineck, Sigwick and Holtzendorff who preferred using Politics. Though people used different terms none knew the difference between these terms. It was Machiavelli who clearly mentioned that politics is a 'Power struggle'. Because of this idea put forward we come to understand that politics refers to the practical operation of power struggle among the competitive players of a political system. This is further justified by Bismarck as 'the art of governing' and by Ernest Benns as 'politics being a subject which puts us in trouble'. Politics was classified into two divisions as Theoretical Politics and Applied Politics by Frederick Pollock. Under theoretical politics the theory of the state, government and legislation or the art of governing is discussed. Whereas on the other hand applied politics discusses about the operation of sovereignty, the government and the political projects done by Politicians to gain their votes are discussed. Further according to Aristotle theoretical politics is a 'study of the state and the citizens' and Hebert Baxler Adams defines it as the 'study of the state, government and people. In theoretical politics we see theories regarding the nature, birth, purpose and best model of the state and the relationship between the state and citizens. In applied politics we see it being put into action. As mentioned above Politics is a power struggle which can be described under three heads as obtaining, consolidating and spreading power.

Keywords

Political, Science, Politics, Theoretical, Applied

Research problem

How do you differentiate Theoretical Politics from Applied Politics?

Analysis

As Bluntushli defines, 'Politics is the art of studying the practical operation of the state. Political science is the art of studying the fundamentals of the state, its nature, different state models, systems and the development of states.

A politician to obtain power, has to be a candidate who fulfills the necessary requirements and secures the adequate number of votes needed to be chosen to the government.

To win majority votes the politicians follow a particular political ideology and organize campaigns, meetings to show their power and services done for the state. Amidst all of this political violence is seen between political parties and individuals. Politicians also use media to keep people aware of the oncoming elections and who they should elect.

A politician consolidates power once he is chosen to the parliament. Politicians take part in policy making and public projects promised to their voters, while looking into the day to day functions of the relevant ministries they are in charge. Development projects are organized in order to further consolidate their power.

Ministers secure their positions in order to be voted for at the next elections and win the hearts by organizing welfare schemes and public projects. Also they carry out a good governance and show their influence and capability to bring the country to development. The study of political science also contains the study in relation to political theory, thought, and philosophy. Political theory is political speculation or philosophizing about political and government activity and is concerned with various theories put up by various people. Political thought is all about thinking and the various thoughts put forward by philosophers. Further political ideology is a programmatic and theoretical application of some grandiose philosophical system which arouses men to political action. It also explains the models which are the most suitable for the governance of the country and then this model is practiced. And this once again shows that theoretical politics in nature has both aspects in it. Furthermore political philosophy is concerned with intellectual thinking.

In the 19th and 20th century politics is put into action based on the theories of the past. Politics at present is at a different level and is discussed in relation to internationalism, Non-governmental organizations, conflict and resolution, public and finance management and globalization and global government.

Internationalism is where the rulers of the present have a close relationship with other countries. Non – governmental organizations are such organizations that serve the state which are not under the ruler- ship of the government. Further conflict at present is at a high level. However at the same time there are resolutions which will solve the conflicts. Through the present aim of rulers is to bring the power under one rule or to centralize the power.

Methodology

Qualitative research method has been adopted to carry out this research work. Sources such as Scholarly Articles, Research papers and Journal Articles have been used to find data. The scope of this paper is to identify a considerable difference between Politics and Political Science and how it has been utilized over the ages.

Conclusion

This research paper is a comprehensive comparative Study on Theoretical Politics and Applied Politics and it could be summarized as follows: In political science, the scientists have a keen interest in the theories, but their work is reduced to the realm of reading and writing which is why it is known as theoretical politics. However in politics, a person engaged in politics is a politician. They have a superficial knowledge about the subject and actively plays in politics which is why it is known as applied politics.

References

Anon (n.d.) Aims & Scope | Political Analysis | Seton Hall University, [online] Available from: <https://scholarship.shu.edu/pa/aimsandscope.html> (Accessed 19 December 2020).

Anon (n.d.) Definition, Scope and Importance of Political Science, [online] Available from: <https://www.managementstudyguide.com/political-science.htm> (Accessed 19 December 2020).

Anon (n.d.) E-Learning, E-Tutoring, School Education Support, Online Education, Digital Learning, Smart Learning, [online] Available from: <https://www.extramarks.com/study-material/icse-class-11/political-science-introduction-to-political-science-scope-of-political-science> (Accessed 19 December 2020).

Anon (n.d.) Political Analysis - an overview | ScienceDirect Topics, [online] Available from: <https://www.sciencedirect.com/topics/computer-science/political-analysis> (Accessed 19 December 2020).

Anon (n.d.) Political Science | List of High Impact Articles | PPTs | Journals | Videos, [online] Available from: <https://www.longdom.org/scholarly/political-science-journals-articles-ppts-list-2555.html> (Accessed 19 October 2020).

Anon (n.d.) Political Science Articles - Inquiries Journal, [online] Available from: <http://www.inquiriesjournal.com/topics/44/political-science> (Accessed 19 October 2020).

Anon (n.d.) Politics is too important to be left to political scientists: A critique of the theory–policy nexus in International Relations - Lorenzo Zambernardi, 2016, [online] Available from: <https://journals.sagepub.com/doi/abs/10.1177/1354066115580137> (Accessed 19 December 2020).

Anon (n.d.) The Scope of Comparative Political Theory | Annual Review of Political Science, [online] Available from: <https://www.annualreviews.org/doi/full/10.1146/annurev-polisci-071113-044647> (Accessed 19 December 2020).

Anon (n.d.) What is Political Science? | Department of Political Science | University of Washington, [online] Available from: <https://www.polisci.washington.edu/what-political-science> (Accessed 19 December 2020).

Anon (n.d.) What is the scope of political science? - Quora, [online] Available from: <https://www.quora.com/What-is-the-scope-of-political-science> (Accessed 19 December 2020).

Anon (n.d.) What is the scope of politics? - Quora, [online] Available from: <https://www.quora.com/What-is-the-scope-of-politics> (Accessed 19 December 2020).

ECKSTEIN, H. (1998) Unfinished Business: Reflections on the Scope of Comparative Politics, *Comparative Political Studies*, SAGE Publications Inc, 31(4), pp. 505–534.

Ford, H. J. (1905) The Scope of Political Science, *Proceedings of the American Political Science Association*, American Political Science Association, 2, pp. 198–206.

Ford, H. J. (1906) The Scope of Political Science, *Proceedings of the American Political Science Association*, Cambridge University Press, 2, pp. 198–206.

Gasiorowski, M. J. (1990) The Political Regimes Project, *Studies In Comparative International Development*, 25(1), pp. 109–125.

Gettell, R. G. (1914) Nature and Scope of Present Political Theory, *Proceedings of the American Political Science Association*, Cambridge University Press, 10(1), pp. 47–60.

Görtz, C. and Dahl, V. (2020) Perceptions of politics and their implications: exploring the link between conceptualisations of politics and political participation, *European Political Science*, [online] Available from: <https://doi.org/10.1057/s41304-019-00240-2> (Accessed 19 December 2020).

Liu, L. and Yang, Y. (2020) Is power zero-sum or variable-sum? Conceptualizing a context-dependent answer to a century-old debate with two game theoretic experiments, *Political Science*, Routledge, 0(0), pp. 1–20.

Nicholson, P. (1977) WHAT IS POLITICS: DETERMINING THE SCOPE OF POLITICAL SCIENCE, *Il Politico*, Rubbettino Editore, 42(2), pp. 228–249.

Trent, J. E. (2011) Should Political Science be More Relevant? An Empirical and Critical Analysis of the Discipline, *European Political Science*, 10(2), pp. 191–209.

A study on political socialization

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Abstract

Socialization is complex and lifelong process. We are all products of our social experience. Socialization teaches us language, culture, to understand others as well as ourselves. Agents of socialization prepares an individual to social life and society. The family being the most important agent as it stands in the center of children's lives, supplying their basic needs, teaching skills, cultural values and attitudes about themselves and others. This also socializes children into gender roles. The school enlarges children's social world to include people with social backgrounds different from their own. Formal schooling gives children a wide range of knowledge and skills and it is in school where the child first experiences with bureaucracy. Peer groups provides young people a chance to develop social relationships and also the opportunity to discuss interests not shared by adults and a sense of belonging that eases the anxiety of breaking away from the family. Media spreads information on a mass scale and functions to connect people, influencing the attitude and behaviour through the images and messages it conveys. Media mirror's the patterns of our society like inequality and rarely challenges the status quo while reflecting the values of the dominant culture. When socialization also could take a political approach and it helps to understand the differences in political perspectives that exist among constituents. Political socialization is a tool for understanding the intra – nation's differences and similarities. Culture is a system of shared values, beliefs, behaviours and norms, which is used to cope the world and has been passed over the generations through learning. It refers to a learning process by which norms and behaviour acceptable to a well running political system are transmitted from one generation to another. It's through the performance of this function, individuals are introduced into a political culture and their orientations towards political objects affordable are formed. Culture changes from society to society and religion to religion. As a result people have developed cultural lenses of looking at each other inter alia stereotypes, biases and culture shock.

Keywords

Socialization, Political, Agents, Government, Culture

Research problem

Are people political beings?

Analysis

Political socialization is a concept concerning the study of the development process by which children and adults acquire political cognition, attitude and behaviours. Through political socialization people acquire their perceptions and feelings about their political environments. It accounts for both the commonalities and differences of political life. It's also an approach in understanding patterns in political outlook among the constituents in a given system. These political views can include our level of patriotism, faith in

democratic systems, standards by which we hold governing bodies and opinion regarding public policies, from the class room to the office to the dining table. Much of our life affects our political opinions. The agents of socialization indoctrinate us in the political society through four basic methods such as: Talents, Manifest affective, Mobilization and Instrumental socialization. Religion, work place, art, state, political events and socio demographic factors, are factors that affect political socialization.

The most important agent of political socialization is media. The media impacts political socialization in three ways: Firstly to build a favourable / non – favourable image of politicians. Secondly being able to determine an agenda that politicians tend to follow. And thirdly media re – enforces the leaders to support a particular party or promote a particular opinion. However it is debatable as to how much impact the media can really have upon voting behaviour. On the other hand, political socialization helps one to understand the development and determination of consensus values or common outlooks.

Furthermore the study of political culture aims to come to an understanding of the institutional and normative structures that make up the terrain on which social, cultural and economic practices take place. It includes the social and political institutions as well as the political process connected with spiritual culture and influences the formation and evolution of state, political institutions, their activity and development. It can be understood as the public's attitude toward and their role within the political system. Political culture refers to what people believe and feel about government, and how they think people should act towards it. To understand the relationship of a government to its people and how those people are going to act towards the government and others, it is necessary to study what people believe about themselves and government. Daniel Elazar has defined it as, 'The particular pattern of orientation to political action in which each political system is embedded'. A more simple definition is 'Attitudes, values, beliefs and orientations that individuals in a society holds regarding their political system'.

Methodology

Qualitative research method has been adopted to carry out this research work. Sources such as Scholarly Articles, Research papers and Journal Articles have been used to find data. The scope of this paper is about Political Socialization and aims at answering the question 'Are people political beings?'

Conclusion

Elements of political culture appear when people begin to participate in political activity with the aim of achieving their own; social, economic and political advantages or possibilities and thereby being involved in political parties, social political groups. It is very difficult to release the driving forces of the political process in society without learning in detail the political culture. Political culture and socialization is the most steady or conservative part of the social, political system and is a good indicator of states policy making. This research paper contains a comprehensive study on Political Socialization.

References

Anon (n.d.) (PDF) In what sense exactly are human beings more political according to Aristotle?, [online] Available from: https://www.researchgate.net/publication/325990495_In_what_sense_exactly_are_human_beings_more_political_according_to_Aristotle (Accessed 19 October 2020).

Anon (n.d.) 'Higher' and 'Lower' Political Animals: A Critical Analysis of Aristotle's Account of the Political Animal on JSTOR, [online] Available from: <https://www.jstor.org/stable/10.5406/janimalethics.6.1.0054> (Accessed 19 October 2020).

Anon (n.d.) 2 Political Socialization Defined: Setting the Context, E-Political Socialization, the Press and Politics, [online] Available from: <https://www.peterlang.com/view/9783653998269/xhtml/chapter002.xhtml> (Accessed 19 December 2020).

Anon (n.d.) Aristotle's Political Theory > Political Naturalism (Stanford Encyclopedia of Philosophy), [online] Available from: <https://plato.stanford.edu/entries/aristotle-politics/supplement3.html> (Accessed 19 October 2020).

Anon (n.d.) Other Political Animals: Aristotle and the Limits of Political Community: The European Legacy: Vol 21, No 3, [online] Available from: <https://www.tandfonline.com/doi/abs/10.1080/10848770.2016.1140398?scroll=top&needAccess=true&journalCode=cele20> (Accessed 19 October 2020).

Anon (n.d.) Political Socialization - Communication - Oxford Bibliographies, [online] Available from: <https://www.oxfordbibliographies.com/view/document/obo-9780199756841/obo-9780199756841-0158.xml> (Accessed 19 December 2020).

Anon (n.d.) Political Socialization, [online] Available from: <https://www.cliffsnotes.com/study-guides/american-government/public-opinion/political-socialization> (Accessed 19 December 2020).

Anon (n.d.) The Family's Role in Political Socialization - James C. Davies, 1965, [online] Available from: <https://journals.sagepub.com/doi/10.1177/000271626536100102> (Accessed 19 December 2020).

Banks, M. H. and Roker, D. (1994) The political socialization of youth: exploring the influence of school experience, *Journal of Adolescence*, 17(1), pp. 3–15.

Bender, G. J. (1967) Political Socialization and Political Change, *The Western Political Quarterly*, [University of Utah, Sage Publications, Inc., Western Political Science Association], 20(2), pp. 390–407.

Hooghe, M. (2004) Political Socialization and the Future of Politics, *Acta Politica*, 39, pp. 331–341.

Humphries, M., Muller, C. and Schiller, K. S. (2013) The Political Socialization of Adolescent Children of Immigrants, *Social science quarterly*, 94(5), pp. 1261–1282.

Koskimaa, V. and Rapeli, L. (2015) Political Socialization and Political Interest: The Role of School Reassessed, *Journal of Political Science Education*, Routledge, 11(2), pp. 141–156.

Kuhn, H. P. (2010) International Perspectives on Political Socialization and Gender: An Introduction, In *Jahrbuch Jugendforschung*, Ittel, A., Merckens, H., Stecher, L., and Zinnecker, J. (eds.), Wiesbaden, VS Verlag für Sozialwissenschaften, pp. 11–24, [online] Available from: https://doi.org/10.1007/978-3-531-92320-8_1 (Accessed 19 December 2020).

Langton, K. P. (1967) Peer Group and School and the Political Socialization Process*, *American Political Science Review*, Cambridge University Press, 61(3), pp. 751–758.

Neundorff, A. and Smets, K. (2017) Political Socialization and the Making of Citizens, *Oxford Handbooks Online*, [online] Available from: <https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935307.001.0001/oxfordhb-9780199935307-e-98> (Accessed 19 December 2020).

Niemi, R. G. and Sobieszek, B. I. (1977) Political Socialization, *Annual Review of Sociology*, Annual Reviews, 3, pp. 209–233.

Petrović, I., van Stekelenburg, J. and Klandermans, B. (2014) Political Socialisation and Social Movements: Escaping the Political Past?, In *The Palgrave Handbook of Global Political Psychology*, Palgrave Studies in Political Psychology Series, Nesbitt-Larking, P., Kinnvall, C., Capelos, T., and Dekker, H. (eds.), London, Palgrave Macmillan UK, pp. 403–422, [online] Available from: https://doi.org/10.1007/978-1-137-29118-9_23 (Accessed 19 December 2020).

PREWITT, K., EULAU, H. and ZISK, B. H. (1966) POLITICAL SOCIALIZATION AND POLITICAL ROLES*, *Public Opinion Quarterly*, 30(4), pp. 569–582.

Publisher, A. removed at request of original (2016) 6.2 Political Socialization, In *American Government and Politics in the Information Age*, University of Minnesota Libraries Publishing edition, 2016. This edition adapted from a work originally produced in 2011 by a publisher who has requested that it not receive attribution., [online] Available from: <https://open.lib.umn.edu/americangovernment/chapter/6-2-political-socialization/> (Accessed 19 December 2020).

Rodrigues, M., Menezes, I., Ferreira, P. D., Rodrigues, M., Menezes, I. and Ferreira, P. D. (2018) Effects of socialization on scout youth participation behaviors, *Educação e Pesquisa*, Faculdade de Educação da Universidade de São Paulo, 44, [online] Available from: http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1517-97022018000100464&lng=en&nrm=iso&tlng=en (Accessed 19 December 2020).

Schonfeld, W. R. (1971) *The Focus of Political Socialization Research: An Evaluation*, World Politics, Cambridge University Press, 23(3), pp. 544–578.

Simon, J. and Merrill, B. D. (1998) Political socialization in the classroom revisited: The Kids Voting program, *The Social Science Journal*, 35(1), pp. 29–42.

Tapper, T. and Salter, B. (1978) From Political Socialisation to Political Education, In *Education and the Political Order: Changing Patterns of Class Control*, Tapper, T. and Salter, B. (eds.), London, Macmillan Education UK, pp. 26–45, [online] Available from: https://doi.org/10.1007/978-1-349-15873-7_2 (Accessed 19 December 2020).

Caste system - a threat to equality in the plantation sector in the Nuwara Eliya district

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Abstract

The caste systems in Sri Lanka are social stratification systems found among the ethnic groups of the island since ancient times. It is one among many systems found in the world. This research was primarily about the Tamils of Indian origins who were brought down to Sri Lanka from India by the British as obliged labourers. This research was aimed to find out how the caste system deprives the right of equality among the people in the plantation sector. Merely, to find the segregations taking place as a result of caste system which is being a threat to equality for the individuals living in the Nuwara Eliya district and try to create awareness among individuals regarding the importance of their fundamental rights. However, it was contradictory to Chapter III of the Constitution of Sri Lanka as it expressly guarantees the right to equality as whole but the applicability in the social strata is conflicting. Finally, according to this research it was identified that caste system still prevails in the society. Even though it does not prevail constantly everywhere, it does prevail in certain circumstances (marriage ceremonies, funerals and religious functions) causing emotional trauma to the people of the so called low caste.

Keywords

Caste system based prejudice, Social Stratification, Discrimination, Plantation sector, Fundamental rights.

Introduction

Caste can be defined as any of the ranked, hereditary, endogamous social groups, often linked with occupation, that together constitute traditional societies in South Asia, particularly among Hindus in India.

The caste systems of Sri Lanka have traditionally not been related to the religious establishment, but rather to the service of the ruling elite-a design more representative of feudalism in Europe. There are at least three major parallel systems in Sri Lankan society: Sinhalese, Sri Lankan Tamil and Indian Tamil.

Tamils of Indian Origin also follow the Indian caste system form which is called jāti. Their caste structure exhibits the village of Tamil Nadu.

The overall objective was to find out how the caste system deprives equality of rights among the people in the plantation sector.

Literature Review

Literatures associated to this research are also comprised in this work. Thomas Johnpulle

in his article, Tamil Caste Discrimination and State Exploitation of Caste Divisions are Causes and Levers of the Ethnic Problem, mainly focuses on the discrimination done to the Tamils by the Tamils themselves due to the caste system.

Dr. Sebastian Rasalingam (Toronto, Canada) in his article, Keeping Tamil culture and uprooting the caste system from the North, mentions about his first-hand experience where he faced discriminations due to caste.

The article, Dealing with caste Prejudice and inequalities in Sri Lanka by Devanesan Nesaiah, deals with the North Indian caste system and mainly focuses on the types of caste systems backed by the Vedas and Manu Smriti, the South Indian and Sri Lankan caste systems.

In the study Caste Discrimination and Social Justice in Sri Lanka by Kalinga Tudor Silva, P.P. Sivapragasam and Paramsothy Thanges goes on to mention that the caste system of Sri Lankan Tamils in Jaffna can be regarded by the religiously expressed concept of untouchability as one that is the most rigid and explicitly defined system of deprivation and social discrimination.

Chapter III of the Fundamental rights, Article 12(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka guarantees equality to all persons and article 12(2) guarantees that no citizen shall be discriminated on the grounds of race, religion, language, caste, sex, political opinion, place of birth of any such grounds.

In Article 1 of the Universal Declaration of Human Rights (UDHR) states that “all human beings are born free and equal.” Article 2 emphasizes on “freedom from discrimination” and Article 4 states about “freedom from slavery”.

Research Methodology

This study was to analyze whether the caste discrimination in the plantation sector still prevails or not. Therefore, the research approach was a concoction of qualitative and quantitative, descriptive and analytical methodology.

The study was conducted in the plantation sector, in the Nuwara Eliya zone, Hatton region where the plantation sector is prominent and which was easy to gather desired information.

The target population for the research were estate workers, family members of the estate workers, managers and supervisors of the estate and the general public in the catchment area.

The sampling size was 10 persons between the age of 16-29 years, 10-12 individuals who were 30 years and above and 4 people were selected based on judgemental sampling.

Data for this study have been gathered from numerous resources of the secondary information methods such as paper articles, statutes and electronic documents. The primary data has been gathered from questionnaires and structured interview with significant informants.

Results and Discussion

Data analysis as per qualitative interpretation of data – Questionnaire.

Ten participants from 16-29 years gave their opinions as to; a very large majority were from the lower class (90%), 85% of them agreed that caste system prevails, 99% of them stated that caste system is mainly considered during marriage, 50-50% of them stated that people are given prominence according to either class or caste and a significant proportion of them stated that their right to equality was not protected (60%).

Twelve participants from 25 years old and above gave their opinions as to; caste system plays a major role in their lives. Majority of them agreed that caste system is predominantly regarded when getting married (99%), 75% of them agreed that their grandparents have faced difficulties due to caste system, majority accepted that caste system still prevails and a significant proportion agreed that a person is more likely to be treated according to the prevailing caste system.

Data analysis as per qualitative interpretation of data – Interviews.

The four selected informants were; a practicing lawyer, a law student, and an experienced estate field officer. All are in support that caste system plays a significant role and all of them agreed in certain situations that caste system is a threat to equality.

Conclusion

This research is mainly focused on the caste system, social stratification, and the impact of caste system on the individuals living in the plantation sector. This research concludes that caste system prevails passively in the society; it was evident that it does not prevail at the workplace (tea estates) but it does prevail during certain events; marriage ceremonies, kovil-thiruvizhas, funeral houses etc.

It was found that law is concerned with right to equality and it is not being biased. But the society is depriving the right to equality of the people who are of low caste. It is apparent that in the plantation sector, right to equality is not guaranteed. It is understood from the experience of the lawyer that caste is inherent within the people and that cannot be reformed.

It also should be noted, that the caste system does not deprive the right to equality like in India because it works impliedly in Sri Lanka. To expect a change with regard to caste system is challenging because the older generation are in the verge of teaching their practice to their younger generations.

Suggestions for further research

This research studies the actual application of caste system and to examine if it is a threat to equality in the plantation sector. The areas for the future researches are;

A detailed study on the caste system of Tamils in the plantation sector, the impact of caste segregation in the minds of the youngsters / children would determine the actual unscrupulous effect caste system has made, and a detailed study on the case laws regarding fundamental rights, article 12(2), especially with regard to caste system of Hindus in Sri Lanka.

References

Johnpulle, T. (2011, October 03). Tamil Caste Discrimination. Retrieved from Sri Lanka Guardian: <http://www.srilankaguardian.org/2011/10/tamil-caste-discrimination.html>

Johnpulle, T. (2011). Tamil Caste Discrimination and State Exploitation of Caste Divisions are Causes and Levers of the Ethnic Problem. Sri Lanka.

Kalinga Tudor, P. S. (2009). Caste Discrimination and Social Justice in Sri Lanka, volume 3, Number 6.

Madan, T. (2019, February 14). Retrieved October 21, 2019, from Encyclopædia Britannica: <https://www.britannica.com/topic/caste-social-differentiation>

Nesiah, D. (2016, 11 24). Groundviews journalism for citizens. Retrieved from Dealing with Caste Prejudice and Inequalities in Sri Lanka: <https://groundviews.org/2016/11/24/dealing-with-caste-prejudice-and-inequalities-in-sri-lanka/>

Nesiah, D. (2016). Groundviews Journalism for citizens. Dealing with Caste Prejudice and Inequalities in Sri Lanka.

Szczepanski, K. (2019). History of India's caste system.



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Human Resource Strategies to Manage Workforce Diversity Performance on Automobile Industry in Sri Lanka

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Abstract

Workforce diversity is a complex phenomenon to manage in an organisation. The Management of Workforce diversity as a tool to increase organizational effectiveness cannot be underscored, especially with current changes sweeping across the globe. In this current situation there is a wide spectrum in implementing broad Human Resource Strategy in Automobile Industry to foster diversity among the employees through the Implementation of strategies in the field of recruitment, training and promotion. The study explore that human resource strategies to manage workforce diversity and performance on automobile industry in Sri Lanka. The research was contacted in the auto mobile industries in Ampara district to find out the most appropriate strategies to manage the workforce. 50 questionnaires were issued to collect the data to the employees of Auto mobile companies such as HR manager, assistant HR manager and other executive and non-executive employees. The results show that the company focuses higher level of strategies in recruitment and training to manage the workforce in order to increase the performance.

Keywords

Workforce diversity, Human Resource Strategies, Promotion Strategy, Training Strategy, Recruitment strategy

Introduction

Managing diversity means establishing a heterogeneous workforce to perform to its potential in an equitable work environment where no member or group of members has an advantage or a disadvantage. Through effective integration of diversity management principles in the key human resource functions of recruitment and selection, training and development, performance appraisal and remuneration, an organisation can effectively manage workforce diversity. (Sohal, 1999).

Today, there is a wide spectrum of organizational response in managing workforce diversity. So this research mainly focused on implementing broad human resource strategies to foster change in culture and work processes. Most multinationals have observed that different types of HR strategies help the organization to become successful and through that there is an increase in the productivity given by employees. Human Resource Strategy comes out with the process of ascertaining objectives of business unit to create necessary changes.

Literature Survey

The concept of diversity includes acceptance and respect. It means understanding of each individual is unique, and re-organizing our individual differences. (Harvorts, 2012). Today's organizations are facing numerous challenges in developing organizational diversity in HRM which should consciously develop a culture which will unify diverse employees under common value sets and thus helps in embracing diversity as a tool for augmenting organizational effectiveness and performance. Thus, diversity management becomes an essential part of HR strategies. (Subhash C. Kundu1, n.d.). The business case for HR diversity strategies links recruitment, selection, development and retention of a diverse workforce to business goals. (Ellernst, 2005)

Research Methodology

The research carried out Descriptive and correlation analysis by using spss software to arrive the conclusion. 50 questionnaires were issued which cover all the aspects of the variables. The conceptual framework was developed based on the literature survey. Primary and secondary data were used.

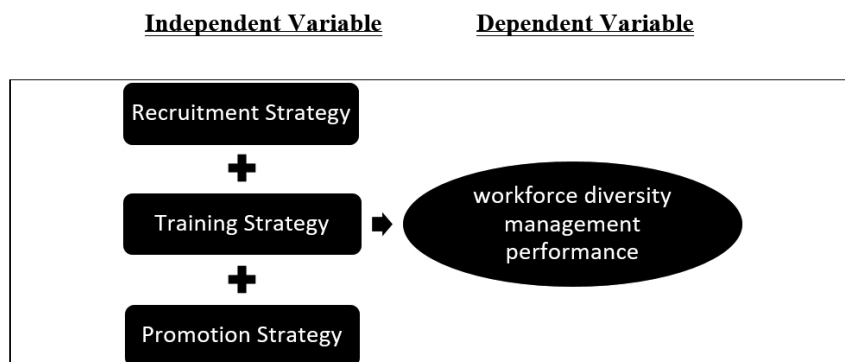


Figure 01: Conceptual Framework

Results & Discussion

The results shows that the two recruitment methods used by automobile industry is social media and College recruitment. According to the analysis 64% of them agreed that recruitment strategies is essential to increase the workforce diversity performance. Everyone has access to equal employment opportunities regardless of their differences. 58% of them agreed that training strategy improve the performance because when training is provided the mindset of the employees also will change and it promotes multicultural understanding. Fair promotion strategy is important to reduce the conflict among the employees. In the correlation analysis training strategy is positively correlated with performance in the value of 0.591. Recruitment and promotion strategy shows 0.587, 0.531 positive correlation value.

Conclusion

The research is been done in the automobile industry which is strongly committed to workforce diversity. The organization follows the proper HR strategies to manage the diversity to increase the performance. This industry mostly focuses on training and promotion strategy that have positive correlation with the performance.

Reference

Ellen Ernst Kossek, Salobeland Jennifer B. R., 2005. Human Resource Strategies to Manage Workforce Diversity. Examining 'The Business Case', Issue 7/18/2005, 03-Konrad-3293., pp. 53-66.

Harvorts, 2012. Managing the work force diversity. sageopen, pp. 1-15.

Sohal, B. D. a. A. S., 1999. Human resource practices and workforce diversity. International Journal of Manpower,, Vol. 20 No. 8(MCB University Press, 0143-7720), pp. 530-547.

Subhash C. Kundu¹, J. B. a. A. S. C., n.d. Managing Workforce Diversity Through HR Practices. Emerging Horizons in Business Management.

Identifying Challenges in Workforce Diversity in Sri Lanka

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Abstract

Diversity is a set of conscious practices that involves understanding and appreciating inter depends of humanity, culture and the natural environment, practicing mutual respects for qualities and experience. The aims of the research is to find out the challenges in the workforce diversity in the courts in Ampara district. The challenges are divided into two parts such as individual challenges and organizational challenges. The data were collected by using the questionnaires and qualitative analytical methods are used to arrive the conclusion. 50 questionnaires were issued to the staff of the court such as management assistant, development officers, registrar and accountant. Data were analyzed by using the Spss software and descriptive, correlation analysis were done to find out the relationships. The results show that workforce diversity challenges have greater impact on the organization. In individual challenges ethnic and culture indicate higher barrier for the workforce diversity management. There is relationship between the individual challenges and the organizational challenges. Acceptance and respect, discrimination and lack of understanding play the major role in the organizational challenges. The organizations maintain the proper HR policies to create the awareness about the workforce management can reduce the challenges in the courts in Ampara district.

Keywords

Workforce diversity, Questionnaires, Descriptive, Correlation analysis, Discrimination

Introduction

The concept of diversity means understanding that each individuals is unique and recognizing our individual differences. These can be along the dimension of race, ethnicity, gender, sexual orientations, socio economic status, age, physical abilities, culture and political beliefs or other ideologies. It is about understanding each other and moving beyond simple tolerance embroiling and celebrating the rich dimension of diversity contained within each individuals.

Diversity management has many barriers in the organization. These barriers are divided into some main topics such as Communication issues, Diversity implementation challenges, Too many opinion, Gender equality, Acceptance and respect. The objectives of the research is to identify most frequently encountered challenges to manage the work force diversity in the courts in the Ampara district and identify most appropriate strategies to decrease conflict in the organization.

Literature Survey

A Diverse workforce refers to a group of people working together within the organization from various socio-cultural backgrounds. Diversity includes factors such as race, gender, age, colour, physical ability, ethnicity, etc. (Kundu and Turan, 1999). Organizations now a days have been giving utmost importance to Human Resources as employees are considered to be the biggest assets. Organizations always try and set mechanisms to help the employees increase their performance. One such technique which is gaining momentum is having a diverse workforce. Diversity include age, race, ethnicity, religion, culture, gender, capabilities & sexual orientation (Das and Wagar, 2007). Organizations are moving to the global environment especially in the government sector in Sri Lanka. This has led to an increase in the heterogeneousness among employees and has increased the challenge of organizations to manage diverse employees. Incorporating diverse people and their perspectives has become a major concern for every organization. The consequences for not managing diversity would lead to lack of skills, competencies, and interests in employees, which will ultimately increase employee turnover and reduce individuals' and organizations' performance to a great extent. Organizations that manage diversity are recipient of more commitment, and better satisfied as well as better performing employees. (Patrick, 2012)

Research Methodology / Materials and Methods

The chapter represents the methodological foundations that addresses research questions and hypothesis for understanding the challenges in work force diversity. This chapter includes objectives description of research design, Sample design, data collection tools, mode of data collection, methods of data analysis. The data were collected by using the questionnaires and qualitative analytical methods are used to arrive the conclusion. 50 questionnaires were issued to the staff the court.

Analysis and Conclusion

Data was analyzed by using the Spss software. Frequency analysis and correlation analysis were done to find out the relationships.

1. Personnel Information:

- i. Gender:** 54 % of male and 46% of female participated in this research.
- ii. Educational Level:** 51% of graduates, 30% of A/L qualified employees and 19% other qualified employees participated in this research.
- iii. Region:** 70% of the employees from eastern province and 30% of employees from other provinces were participated.

2. Individual challenges

In this section indicate the individual challenges faced by an employee in an organization. The challenges are ethical, cultural difference, language barriers and gender harassment.

Table 01: Individual Challenges

		Personal_ Challenges %	Ethical and Cultural difference	Gender_ Harassment
Valid	Strongly Disagree	6.0	12.0	8.0
	Disagree	18.0	14.0	24.0
	Neutral	16.0	18.0	30.0
	Agree	26.0	28.0	20.0
	Strongly Agree	34.0	28.0	18.0
	Total	100.0	100.0	100.0

The above table indicates that 60% employees are saying that they are facing personal challenges and 24% of employees are saying that they are not facing the problem. At the same time 56% employees are saying that they are facing ethnical and cultural difference. 38% employees are saying that they are facing gender harassment and rest of them are not. In individual challenges ethical and cultural differences are facing more by employees in the organization. To reduce the Ethical and Cultural challenges teach them about the every religion and teach how to respect other religion.

3. Organizational Challenges

This below table shows that, the organizational challenges faced by an employee in an organization. The below table indicates that 58% employees are saying that they are facing challenges in the organization and 16% of employees are saying that they are not facing challenges in the organization. And also it indicates that 48% employees are saying that acceptance and respect important for an organization. The below table indicates that 68% employees are saying that there is no rescue option to be safe in an emergency situation in the organization. 60% employees are agreed that wages are not given according to the educational level. In the correlation analysis the pearson correlation value show 0.445 that means moderate positive relationship between individual challenges and organizational challenges. Individual challenges that lead to the organizational challenges.

Table 02: Organizational Challenges

		Organizational Challenges	Acceptance Respect	<u>Rescue option</u>	<u>Wages Educational Level</u>
Valid	Strongly Disagree	4.0	8.0	8.0	2.0
	Disagree	12.0	22.0	12.0	18.0
	Neutral	26.0	22.0	12.0	20.0
	Agree	32.0	22.0	42.0	32.0
	Strongly Agree	26.0	26.0	26.0	28.0
	Total	100.0	100.0	100.0	100.0

Conclusion

This research examines about the Identifying challenges in workforce diversity in the organization. Based on a qualitative analysis this research was accomplished. The result indicates that there are many challenges in the organization and how to overcome those challenges. This is a multi-cultural organization and every employees are from different areas so they are facing ethnical or cultural problems. According to the analysis in this organization wages are not given according to the educational level. So 60% of peoples are accepting that wages are not given according to the educational level. The organization wants to create HR policies and practices to reduce the challenges.

Reference

Patrick, H., 2012. Managing workforce diversity : issues and challanges. Sage open, pp. 1-15.

Schwind, H., Das, H., & Wagar T. (2007). "Diversity management". In H. Schwind, H. Das, & T. Wagar (Eds.), "Canadian Human resource management: A strategic approach" (8th ed.), 486-524. Toronto: McGraw-Hill Ryerson

Kundu, S C and Turan, M S, (1999). "Managing Cultural Diversity in Future Organizations", The Journal of Indian Management and Strategy, Vol. 4 (1), pp. 61-72

Impact of hertzberg motivation factors on employee performance

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Abstract

This research mainly focuses to examine the impact of Herzberg motivation factors on employee performance of banking sector employees in Sri Lanka. The study uses a questionnaire survey to statistically analyze data responses gathered from 100 permanent employees in banks. Findings of this research inform that appreciation, responsibility and recognition have a direct influence on employee performance. Researcher believes that this study provides useful insight on the subject of employee performance to support researchers intending to understand or develop a framework on the impact of Herzberg's motivation factors on employee performance. Moreover, executives and analysts will find additional recommendations to integrate in their strategic planning or decision-making. This research adds to the relatively few studies measuring employee performance using banks in Sri Lanka.

Keywords

Employee Performance, Appreciation, Recognition, Responsibility, esteem-needs and Herzberg's two factors.

Introduction

Human resource practices are really important for the betterment of the organizations (Hallberg & Schaufeli, 2006). Human resource is the most valued tool and asset of the organizations to compete with other organizations (Armstrong, 2006). Without proper HR practices, development cannot take place in any organization, Nowadays, employees are the backbone of any organization. They are the most precious and important asset among all the assets of any organization, without which the organization cannot achieve its goals. Human resources practices such as employee empowerment, recognition, and appreciation are directly linked with the overall development of the organization and employee performance Considering that human needs and wants are unlimited and insatiable and also putting into consideration that employees' motivation is a basic psychological process (Del Val and Fuentes, 2003).

One of the biggest motivators for employees is to be held in high esteem by their peers. Motivated employees perform better and appreciation helps to enhance employee performance, achieve organization goals, and help to long run the company (Pratheepkanth, 2011). Motivating employees involves both monetary as well as non-monetary programs. According to Herzberg two factor theory appreciation, recognition and responsibility are non-monetary factors and these two factors directly affecting employee morale.

However, the most common problem in the organization today is that they miss the important component of appreciation, which is the low-cost, high-return ingredient to a

well-balanced workplace performance (Pratheepkanth, 2011). A key focus of recognition is to make employees feel appreciated and valued. Research has proven that employees who are recognized tend to have higher self-esteem (Mason, 2001). It is very obvious and proved that the employee morale effects on the level of performance. However, there is no attempt in Sri Lanka to prove the psychological impact of appreciation, recognition and responsibility which directly affects employee morale on employee performance. Therefore, this study attempts to unfold the impact of employee appreciation, recognition and responsibility on employee performance.

Research Methodology

This is quantitative study based on positivism and follows deductive approach. The survey was conducted among the bank staffs of both private and public banks in Sri Lanka. Hundred questionnaires were issued to the bank staffs. This research is a mono quantitative research. A closed ended questionnaire is designed of using five-point Likert scale to collect data. The data was analyzed using statistical techniques in SPSS. Multiple regression analysis was performed to study the significant relationship between the factors selected for the study.

Conclusion

The Cronbach Alpha was used to compute the reliability of the measures of the variables of the study using the various questionnaire items administrated to the respondents. The reported alpha values were above more 0.7 and that validates the internal consistency of the items. The F statistic was 44.065 and was a significance level at percent ratifying the overall validity of the model. Adjusted R² for this model was 56.6 percent and 56.6 percent this implies that the variation in employee performance could be explained by appreciation, recognition and reasonability of the bankers. The beta coefficient of recognition was at 0.48 and was significant at 1 percent significance level. The beta coefficient for appreciation and responsibility were 0.17 and 0.22 respectively and they were significant at 0.10 and 0.05 significance level respectively. This clearly shows that appreciation, recognition and responsibility have positive influence on employee performance.

References

Armstrong, M., 2006. Competition in two-sided markets. The RAND Journal of Economics, 37(3), pp.668-691.

Del Val, M.P. and Fuentes, C.M., 2003. Resistance to change: a literature review and empirical study. Management decision.

Hallberg, U.E. and Schaufeli, W.B., 2006. "Same same" but different? Can work engagement be discriminated from job involvement and organizational commitment? European psychologist, 11(2), pp.119-127.

Mason, L.J. (2001). Retaining Key Personnel. Plus: Top 10 Retention Tips. Stress Education Center. Viewed: August 27, 2020, from [http: www.dstress.com](http://www.dstress.com).

Pratheepkanth, P., 2011. Reward system and its impact on employee motivation in commercial bank of Sri Lanka plc, in Jaffna district. Global Journal of management and business research, 11(4).

Effect of Workforce Diversity on Employee Performance

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Abstract

This report critically evaluates the effect of workforce diversity on employee performance in banking sector. Two concepts were comprehensively deliberated throughout the whole project. Initially, the concept of workforce diversity which is defined by age, gender and educational background towards employee performance in an organization. Next, Employee performance depicts on how workers behave in the workplace and how well they perform the job duties obligated to them.

The impact of workforce diversity on employee performance has been outlined under two different variables namely; Gender and educational qualification by the author. This research probably would benefit and be useful for the interns and junior executives of HNB Bank. It has been studied that the overall positive impacts has an upper hand over the negative impacts experienced by HNB Bank.

Author Keywords

Workforce Diversity, Employee Performance, Gender, Educational Qualification

Introduction

The term diversity includes and understanding and acceptance of the fact that people have individual characteristics, which make them unique from each other, particularly when comparing individuals in a group. Diversity in the workplace is vital for employees because it establishes itself in constructing a great reputation for the company, leading to increased productivity and opportunities for workers. Employee performance is very significant to achieve goals where successful employees meet deadlines, make sales and build the brand through positive customer interactions.

Aim of the research

The aim of the study is to analyze the effect of employee diversity on employee performance at HNB Bank

Methodology

The research was conducted by the use, the Saunder's Onion research model .This research model contains of six stages namely, the philosophies, approaches, research method, strategies used, time horizons and techniques and procedures.

The chosen project methodology was quantitative mono- method with an open survey, and questionnaire as the data collection tool. A sample size of thirty was designated; the researcher was able to get at of all thirty employees. The sample was selected on probability random method. The researched has selected HNB Bank as the organization to complete the research. HNB bank falls under the sector of banking. The main objectives of conducting this research is – first, to determine the effect of gender on employee performance, second- to determine the effect of educational qualifications on employee at HNB Bank

Findings

According to the research, it is been stated that women are equally participating at all positions as they are not examined as less skilled and less qualified for many jobs in the organization. Also required safety measures are implemented for women who work during night shifts. Moreover, it was been found out that equal and identical opportunities are given in decision making and training programs for the betterment of the organization. HNB Bank employees have complied with, that presence and acknowledgement of women can encourage individual and organizational performance. Variation and favouration towards a particular gender cannot be seen in this organization. As gender diversity is considered as one of the top priorities in HNB Bank as it stands a chance retain a talented workforce and increase performance it correlates with employee performance.

The author had found that, that lack of confidence is being accomplished due to educational background in HNB Bank. However, working with colleagues with different educational backgrounds improves problem solving, decision making and encourages positive relationship among employees. It can also be evidently indicated that, there is no adverse connection between educational diversity and the top management in HNB Bank when specific decisions are made. Despite the fact that highly educated employees can be bossy and dominating and they do not make the other employees uncomfortable. Besides, managers do not pay attention on individuals with educational background for the recruitment of minor staffs. Similarities in the educational level of employees upsurge the turnover rates. Moreover educational diversity has a positive relationship with employee performance in HNB Bank.

The findings of the study show that there is a positive relationship between gender equality diversity and employee performance. If there is equality employees are motivated and feel contented and happy and thereby leading for improved work performance.

Conclusion and Recommendations

The research is mainly focused on the influence of having a diverse workforce on the performance of employees in the organization. According to the data analysis, it is being concluded that HNB Bank does have an idea on workforce diversity and employee performance and also how to deal with such situations. Overall a gender diverse workforce allows the company to serve an increasingly diverse customer base. Also educational diversity in the workplace makes and employee gain more comprehensive understanding of the business matter and teaches them how to use their own strengths and points of view to contribute in a diverse working environment.

When there is equality and diversity in the workplaces the employee become motivated, when they are motivated there is a tendency for them to work more and their performance will increase. According to the research it is being studied that majority of the employees are contented in HNB Bank but, with little shorts coming.

Thus, researcher would like to recommend that if HNB Bank could reject gender based roles in the company and providing training in specialized skills and recognizing the power women bring to your company will help company's progress in a good landscape. Additionally, HNB Bank must provide training opportunities for employees who lack with

skills for required job. Also the management should encourage employees by providing study leave to employees who wish to study further, also provide financial aid by sponsoring high performance acquire some certification that will improve performance. This can be an extremely a motivation to other employees.

References

Ali M Alghazo, H. M. A. S., 2016. The Effect of Workforce Diversity on Employee Performance.

Amarasinghe, U., 2017. Business Today. [Online]
Available at: https://www.businesstoday.lk/cover_page.php?article=11356&layout=sp&issue=309
[Accessed 29 09 2020].

Dudovskiy, J., 2020. research-methodology.net. [Online]
Available at: <https://research-methodology.net/sampling-in-primary-data-collection/purposive-sampling/>
[Accessed 20 05 2020].

Hatton National Bank PLC, 2020. Hatton National Bank PLC. [Online]
Available at: <https://www.hnb.net/about-the-bank/our-profile>
[Accessed 29 09 2020].

Hatton National Bank, 2020. hnb.net. [Online]
Available at: <https://www.hnb.net/>
[Accessed 29 09 2020].

Current issues of equality and diversity in the work place and how management respond to these issues

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Abstract

This report critically evaluates equality and diversity issues at workplace based on culture and gender. An in-depth analysis is given how the management respond and the strategies adapted to overcome these issues. The research was performed at Cinnamon Citadel Kandy which comes under Hotels and Resorts sector of John Keells Holdings PLC.

The concept of equality and diversity at workplace simply means how a company actively welcomes people from a variety of backgrounds and treats all of its employees equally without any discrimination. This research is useful for the executives, employees working in the HR division and all the other departments in the selected organization. The research provides how effectively the management has responded to these issues, strategies adopted in such processes and how these can be improved further.

It was identified that effective monitoring delivers equality and diversity in the workplace. The researcher concluded delivering equality and diversity within the organization takes more than just policies and procedures. The researcher also analyzed that the key benefits of maintaining equality and diversity has improved the brand value of the organization with successful outcomes. The research project gave the organization a learning, created a better understanding within the staff, measured the outcomes of programs, and gives a better understanding on community needs.

Author Keywords

Equality and diversity, gender, culture

Introduction

From confirmation to inclusion, the idea of workplace equality and diversity is evolving. Granting equality of opportunity for all employees (John Keells Group, 2020) through diversity giving each the opportunity to achieve, free from prejudice and discrimination is the main focus of this topic. Workplace equality and diversity have assumed a new face and are much different from, for instance, what they were a few decades ago. Today, workplace equality and diversity are no longer exclusively about antidiscrimination complaisance- they now focus on inclusion and the effect on the outcome. Leveraging workplace equality and diversity is progressively understood as a spirited strategic reserve for competitive advantage of an organization and employees in it. A workplace encouraging equality, diversity and inclusion can help: make it more successful keep employees happy and motivated prevent serious.

Aim of the Research

To find current issues of equality and diversity at work place and how management responds to these issues.

Methodology

The researcher has chosen mixed method as the research methodology for the research. In this kind of data analysis a combination of qualitative and quantitative method attempts to understand multiple view points, perspectives, positions, and includes the standpoints of qualitative and quantitative research. In this way the researcher managed to eliminate the limitations present in both qualitative and quantitative methods. Questionnaire was used as the data collection tool. The research questionnaire contained a mix of open ended, closed ended questions and Likert scale questions. The questionnaire was chosen since it very feasible and it is a quick way to gather data. It also allows effective and efficient analysis of gathered data.

There were around 450 employees working at Cinnamon Citadel Kandy from this population a sample of 30 employees were chosen to complete the thesis. Probability sampling technique was primarily used since it is based on the principle of randomization and the data obtained is more reliable. In the above mentioned method the researcher chose stratified probability sampling method to get the sample where employees were selected randomly representing each department.

The main objectives of this research was to find out issues related to culture specifically language and issues related to gender at workplace, find out management strategies adopted by the organization to reduce such issues and provide suggestions to the organization with the analyzed data to minimize these issues and improve further.

Findings

The research results suggest that practicing equality and diversity within the organization has helped the management as well as the organization to improve their brand value and gain competitive advantage in the tourism industry. Statistical data gathered from the survey when analyzed proves that there were minor issues in gender equality within the organization like less women were in the workplace, but in comparison the overall result was very positive and illustrates that there is less gender discrimination at Cinnamon citadel. The researcher was able to find that the John Keells holdings takes necessary steps to reduce this issues and are committed to recruiting, developing and promoting individuals who best meet the requirements of available positions and possess the required competencies, experience and qualifications, irrespective of any culture or gender.

The study proves that the organization tests the language skills of employees during recruitment and also provides necessary training for the ones who work currently. It was found that the organization encourages employees with good speaking skills and at the same time avoids any discrimination happening within the staff. The organizations management is diversified creating a fair and safe environment where everyone has access to opportunities and challenges. The management actively promulgates policies, implementing international rules and regulations designed to support equality and diversity at workplace.

Conclusion and recommendation

The lack of women in hospitality management field has lagged tourism industry of not only Sri Lanka but other international countries as well. With the gathered data well analyzed it was very visible that equality in the organization was still an issue but one considerable factor is that organization is taking necessary steps to educate, provide necessary training and change this state. This process takes a lot of time but so far the organization and management had been very successful in it. With the statistical data by analyzing deeply the report concludes that by employing people of all genders and races can make an organization stronger and there is a lot of development that still needs to happen in order to achieve this, the following recommendations were proposed.

Gain senior management's commitment to practice the enforced rules and policies and highlight all the staff about gender equality and other diversity issues. Having random reviews of all existing salaries as well as overall compensation and benefit programs for equity. Since there were less women the researcher suggested to place capable women alongside their male counterparts in key strategy roles such as operations, marketing, human resource and finance. Get necessary advice from a labor/employment lawyer to suggest changes to policies and practices to avoid claims and litigation concerning gender and other diversity issues.

Expand both internal and external outreach so that recruitment draws over a broader geographic area and make sure that employees recruited equally so that there won't be any minorities. By expanding the geographic scope of your recruiting, you'll reach more potential candidates. Offer rewards to employees for ideas on developing inclusive mentoring culture that values everyone's contribution regardless of gender or culture. Gain ideas from other stakeholder including guests, bankers, and union and community leadership.

Bibliography

Anon., 2009. Quantitative, Qualitative, and Mixed Research Methods in Engineering Education, Washington, D.C.: J Eng Educ.

John Keells Group, 2020. John Keells Group; committed to Women Empowerment, Equality and Diversity.. [Online]
Available at: <https://www.keells.com/news-readmore/1021/john-keells-group-committed-to-women-empowerment-equality-and-diversity>
[Accessed 06 10 2020].

Lynn, D., 2020. How to Promote Equality & Diversity in the Workplace. [Online]
Available at: <https://careertrend.com/how-to-promote-equality-diversity-in-the-workplace-5497866.html>
[Accessed 06 10 2020].

Issues and challenges on equality and diversity arising on workplace and the management

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Abstract

The report critically evaluates Issues and challenges on equality and diversity arising on workplace and the management at Domino's Pizza. Two concepts were discussed throughout the entire projects and they were equality and diversity on gender and culture. Diversity in the workplace is as simple as gathering the necessary quotas for employee race and gender, However, as the workplace becomes more diverse, more problems tend to increase accordingly. On the other hand equality is about ensuring that every individual as an equal opportunity to make the most of their talents.

Here, they can identify what is equality and diversity employees and employers both can recognize in the chosen organization whether they have or have not these issues. If they have they can try to reduce and they can overcome these issues.

Author key words

Equality, Diversity, Issues & Challenges, Gender, Culture

Introduction

The term 'equality' does not simply mean treating everyone the same way, and making sure that everyone enjoys the same rights, It also includes understanding and tackling the different barriers to equal opportunities for different groups of people. And it prevents individuals from being discriminated or treated differently due to certain personality or physical characteristics. (Anon., 2019)

Diversity in the workplace promotes the individuality within an organization, acknowledging that every person can contribute with different creative and new ideas, and solutions. In addition employees with different backgrounds and experiences bringing together a variety of perspectives increasing the productivity levels, and hence delivering improved results. Diversity within the organization helps in building a stronger brand making the company more productive, along with offering better value to its customers. (Sokolova, 2015)

Aim of the research

The aim of the study is to identify the gender and cultural issues at Dominos Pizza and to study how the management manages with it.

The prime objectives of this research is to find out the issues on gender in workplace, and then find out the issues relating to culture, Also how the management of Domino's Pizza deals with these issues, and finally, the researchers suggestions to improve the management strategies.

Methodology

The selected Research Methodology was mono quantitative method with an expressive survey and questionnaire and documentation as the data collection tools. A sample size of 30 employees were expected to get involved in the survey but due to some reasons, only twenty were able to participate and the researcher couldn't get at ten employees.

A Likert Scale Questionnaire was developed to collect data. Appendix2 was for the employees and appendix 3 was for the management.

Appendix 1 was demographic details.

Findings

According to the research it is understood that employees are not discriminated when recruiting on gender basis. However working with gender diversity does raise complexed issues in the organization. About 43% of employees agree with this. And also it shows that women need more career attention than men. A percentage of 36 agree with the statement that if a task is given for an employee men do it individually and women want to be more supportive. Also we have found out that 48% of the employees have agreed to the statement that they are positive about gender diversity in the workplace.

Cultural differences should not separate employees from each other but rather culture diversity brings a collective strength that benefits everyone as proved by the authors. Therefore Domino's do consider about the ethnicity culture. And also it can be proved that different languages that are used to communicate do not create problems with the employees. And the ethnicity differences in the education background do not encourage conflicts instead it inspires creativity and drives innovation among the employees of Domino's. About 48% of the employees agrees with the statement that their positive about ethnicity diverse in the workplace.

Different strategies implemented by the chosen organization enhance improvement in this case management of Domino's provides opportunities to growth the advancement to all of their employees equally. In addition there are special accommodations provide by chosen organization for issues such as pregnancies, nursing, etc. The organization they conduct and equal recruitment policy for hiring men and female. The various training and development programs carried down by meets the specified requirement of both the genders. Dominos also provides paid study leave to an employee who further continues their higher studies irrespective of ethnicity and their culture. The authors were able to demonstrate that gender and culture, diversity is certainly not or issue at Domino's Pizza Kandy.

Conclusion and recommendations

Generally, this research is focused on the influence of having issues and challenges on equality and diversity and also how management deals with it. Based on the data analysis, it has been established that Domino's do not have any issues or challenges based on workforce equality and diversity. When there is more gender, ethnic diversities in the organization it makes the firm more productive.

Hence, it can be recommended that Companies should think over the concept of equal

pay in the workplace, which means pay should be reliant on the job role, and a regular pay structure should be introduced in order to improve the clearness and reduce pay rate issues in the workplace, Conducting an annual pay check can estimate whether gender favoritism is taking place in an organization or not.

Furthermore, Effective communication is another important factor helping to reduce the cultural differences at workplace, because lack of understanding in areas such as non-verbal communication methods, values, and customs might lead towards damaging consequences. But, using visual communication methods, like diagrams, and other info graphics may help convey the message in a more understandable way. In addition the use of body language can also be a part of effective communication, as sometimes the way you say matters than how you say it. For eg; a simple nod and a smile may welcome a positive attitude, and clear up the miscommunication.

References

<https://biz.dominos.com/web/public/about> (Accessed 10 February 2020)

Anon., 2019. Comhairle nan Eilean Siar. [Online] Available at: <https://www.cne-siar.gov> [Accessed 10 March 2020]

Sokolova, S., 2015. Linkedin. [Online] Available at: <https://www.linkedin.com> [Accessed 24 February 2020].

Klarsfeld, A. (Ed.) (2010), International Handbook on Diversity Management at Work: Country Northampton, MA

Thomas, D. and Ely, R. (1996), "Making differences matter", Harvard Business Review, Vol. 74
No. 5, pp. 79-90

Impact of social media information characteristics on social media

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Abstract

Over the years the increase in the use of social media has contributed to rise of marketing sector. Social media has created a great impact in creating the brand awareness in FMCG (Fast Moving Consumer Goods) sector. The purpose of this study was to investigate the impact of social media information characteristics on brand awareness by dividing the information characteristics as information quantity, information reliability and information quality. The objectives of this research were to examine the influence of information characteristics on brand awareness and to identify the information characteristics that assist in creating brand awareness. A survey was conducted to a sample population consisting of 100 respondents from Whatsapp, collected their responses for the questionnaires issued and analyzed the data collected using the statistical analyses in SPSS (Statistical Package for the Social Sciences) software. The results showed that the information characteristics from social media had statistically significant effects on brand awareness. The findings of this study are expected to provide fundamental data for the development of marketing strategies related to FMCG social media.

Keywords

Social Media, Brand Awareness, Information Characteristics

Introduction

Businesses have become competitive than before, so improvements must be made for daily activities continuously. For marketing it is a must since it is important for constant communications, active engagement of customers, builds and maintains reputation of the firms, maintains a healthy relationship between customers and businesses etc. Social media can bring even more developments as it is effective than the traditional marketing methods.

Sri Lankan organizations spend around 56 Billion rupees annually on traditional media advertising (Athukorala, 2012). It is evident that Sri Lankan organizations invest significantly in both social as well as traditional media. However, it is still unclear what kind of impact social media has on brand awareness in Sri Lanka because the existing literature does not provide empirical evidence that is unique to Sri Lanka. To place our understanding of Sri Lanka, other countries can be analyzed to understand the concepts.

According to Balas (2014, cited in Yapa, 2017), social media has significantly increased brand awareness in Romania, while Jokinen (2016,) found that social media can influence the overall impression of a brand image. Factors such as using a site, engagement of it and experience of users, related associations and user awareness of a brand all have a positive impact on the brand image (Nikolova, 2012, cited in Yapa, 2017). Additionally, Maria (2010, cited in Yapa, 2017) mentions that even though there is a huge boom in the

use of social networking sites such as Facebook, the research itself is lagging behind this rapid development making it difficult to find recent studies on social media relationship with the branding process. By taking all these facts into consideration, further research can assist in filling in this gap in the existing literature and thereby identify the impact of social media marketing on brand awareness in fast moving consumer goods in Sri Lanka. This study focuses on the impact of information characteristics of social media on brand awareness in the context of FMCG Sector.

Research Methodology

The research design for this study consists of positivism research philosophy, deductive approach, the unit of analysis is individual customers who are active on social media, primary data collection through surveys and quantitative data. Survey technique is relatively easy to administer, cost effective and relatively free from several types of errors and this is done by issuing questionnaires. Likert scale data is collected for the study. Sampling been done by issuing 100 questionnaires to the people who are living in Colombo via Whatsapp.

Results and Discussion

As per the Cronbach's Alpha reported in the table 2 above, the internal consistency between information quantity, information reliability and information quality and brand awareness is reliable, valid and consistent. Since the Cronbach's Alpha of the variables are above 0.75 all the variables will be used for the analyses of this study.

As per the Correlation coefficient reported, there is a positive relationship between information quantity, information reliability, and information quality and brand awareness. The positive relationship is strong between information quantity and brand awareness, whereas the positive relationship is moderate between information quantity, information reliability and brand awareness and all variables are significant at 1 percent significance level. This implies that when there is no influence of other variables each of information quantity, information reliability and information quality have a significant influence on brand awareness. This positive influence of information characteristics on brand awareness is also evident in (Seo, Park and Choi, 2020).

As per the regression results, there is a positive impact of information quantity and information quality on brand awareness and this finding is consistent with (Seo, Park and Choi, 2020).and remains significant at 5 percent significant level. The relationship between information reliability and brand awareness is very weak and insignificant. This reveals that information reliability has significant positive effect on brand awareness in the absence of information quantity and information quality.

Conclusion

The information characteristics of social such information quantity and information quality have a positive impact on brand awareness. Social media helps to give an instant reach which can also be done frequently to FMGC products which are always frequently purchased and consumed by people, sold in rapidly and generates higher turnover. So, social media helps to frequently remind a particular brand which will be stored in the minds of consumers who will be able to recall or recognize when they come across the particular brand out of the other brands since that brand has been familiarized to

them very well through social media in which they are engaged for many hours. So, the researcher concludes that social media has impact on brand awareness, especially in the FMCG sector.

References

Athukorala, P.C., 2012. Sri Lanka's trade policy: Reverting to dirigisme?. The World Economy, 35(12), pp.1662-1686.

Jokinen, T., 2016. Branding in social media and the impact of social media on brand image.

Seo, E.J., Park, J.W. and Choi, Y.J., 2020. The effect of social media usage characteristics on e-WOM, trust, and brand equity: Focusing on users of airline social media. Sustainability, 12(4), p.1691.

Yapa, U.A., 2017. The Impact of Social Media on Brand Awareness (With Special Reference to Facebook Use in Fast Moving Consumer Goods in Sri Lanka). International Journal of Engineering and Management Research (IJEMR), 7(5),pp.262-272.

Impact of workplace motivation, environment and leadership behavior on employee psychological capital

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Abstract

Employee's psychological capital determines an employee's rate of engagement, commitment and productivity. The objective of this research is to evaluate the key determinants of the psychological capital of the employees. The research utilizes a survey questionnaire to statistically analyze data responses collected from 100 permanent employees an organization. Outcomes of this research reveals that 'leadership behavior' and 'workplace environment' have a positive relationship with employee's psychological capital and thus directly impact the employee's psychological capital.

Keywords

Psychological capital, motivation, leadership, workplace environment

Introduction

Today's business environment is extremely dynamic and even more competitive. In this ever-evolving corporate ecosystem, the key to success of any business is not the customers, it is the employees of the company (Schurenberg, 2018). Every individual's performance depends on his or her psychological capital. A proficient employee could struggle if he is not in a positive psychological space. This can in turn impact the organizations productivity. The Human Resource department, here on referred to as the HR department is responsible for ensuring that the workplace environment and the culture within the organization, is positive and healthy. In the past, employee's psychological wellbeing was rarely given importance, but recent studies have proved that employee psychology can have a ripple effect on the overall performance of the organization.

Many researchers have attempted and have examined the impact of motivation, leadership and working environment on employee performance but there is very little to no research carried out to study the impact of those factors on the employee's psychological capital. Hence, this study attempts to examine the factors that could have an impact on the psychological capital of the employees.

Methodology

This research is an objective type of research in which conditions and measurements are not subject to alteration owing to the views of the respondents. Data was obtained by means of a closed-ended questionnaire using the Likert five-point scale measurements. Since this study utilizes a finely rationalized questionnaire, evaluated with a five-point Likert scale, it is certain that this study reflects a positivism framework. This research adopts a deductive approach as it examines prior studies and its outcomes, theories as well as philosophies correlated to the aspects that impact employee's psychological

capital to formulate appropriate variables and propositions. For data compilation and analysis, a closed-ended questionnaire is employed, and further statistical methodologies are used to interpret the data. Strongly correlated variables are validated on the basis of a statistical analysis. This is identical to the deductive approach. This study employs quota sampling approach to make sure different level and employees of different department are included. The sample size is limited to 100 employees due to time constraints. The sample excludes employees working on interim periods comprising trainees, interns, and employees on probation.

Results & discussion

The results of a multiple regression analysis on all independent variables (Motivation, workplace environment, leadership) predicting the dependent variable employee psychology capital. It has an F-statistic of 58.65 and a significance level at 1% ratifying the overall validity of the model. The adjusted R square value is 15.5 percent and implies that there is 15.5% variation in the dependent variable, employee psychological capital due to the independent variables, motivation, working environment and leadership. This in turn implies that just a minor portion of psychological capital is influenced by the selected independent variables. Nevertheless, the significant F statistics proves that this model is a good fit standard.

When all three variables are present, workplace environment and leadership have a p-value level at less than 5%. Therefore, in this model, workplace environment and leadership have a significant relationship with the dependent variable employee psychological capital. This indicates that psychological capital is bolstered when there is improved workplace environment and positive leadership behavior and the findings are consistent with Ismail et al. (2010) who find that workplace environment impacts employee's psychological capital and with the findings of Kim, Karatepe and Lee (2017) that points out leadership has an impact on employee's psychological capital. However, the motivation variable was not observed to be significant when controlling the other two factors and tis finding is inconsistent with the finding of to Datu, King and Valdez (2016). This could be because the employees are better motivated in the presence of a superior working environment and a positive leadership behavior.

Managerial Implications

This research delivers a compelling analysis into three primary determinants of employee psychological capital and recommendations as to how to stimulate the enhancement of employee's psychological capital by optimizing the established determinants. Utilizing the information provided in this report, investigators will be enabled to incorporate complexity of understanding on particular fundamental determinants that impact the psychological capital. Corporate and industrial psychologists may as well be enabled to perceive variables that help enhance employee psychological capital and behaviors and may as well incorporate proposed improvements into existing HR practices to facilitate engagement and generate positive psychological impacts. They can very well undertake further investigations on measures to enhance the defined determinants based on other publications in order to effectively optimize the positiveness of employee's psychological capital. Investigators, related researchers and organizational psychologists will also be appropriate to utilize the information incorporated into this analysis to set the stage for indicators of psychological capital. Together with several other literature on employee

psychological capital criteria, they could develop a viable framework which helps managers to implement an efficient strategy for enhancing and sustaining a consistent positive psychological capital that contributes to improved engagement and productivity.

Reference

Datu, J., King, R. and Valdez, J., 2016. Psychological capital bolsters motivation, engagement, and achievement: Cross-sectional and longitudinal studies. *The Journal of Positive Psychology*, 13(3), pp.260-270.

Ismail, A., Saudin, N., Ismail, Y., Samah, A., Bakar, R. and Aminudin, N., 2015. Effect Of Workplace Stress On Job Performance. [online] Hdl.handle.net. Available at: <<http://hdl.handle.net/10419/193846>> [Accessed 21 September 2020].

Kim, T., Karatepe, O. and Lee, G., 2017. Psychological contract breach and service innovation behavior: psychological capital as a mediator. *Service Business*, 12(2), pp.305-329.

Schurenberg, E., 2018. Richard Branson: Why Customers Come Second At Virgin. [online] Inc.com. Available at: <<https://www.inc.com/eric-schurenberg/sir-richard-branson-put-your-staff-first-customers-second-and-shareholders-third.html>> [Accessed 1 September 2020].

Impacts of Global Warming

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Abstract

Releasing of heat trapping gases over the centuries is a contributor to the current environmental condition faced which is termed as global warming. These gases are also known as greenhouse gases which keep increasing as a result of powering our modern lives. This is causing a change to the Earth's climate or long term weather patterns. Melting of glaciers, rising of sea levels, dying of forests and scrambling of wildlife is happening to a pace as a result of it. Many people think that global warming and climatic changes as synonyms, but scientists use it to describe the complete shifts that take place in our planets weather and climatic system. Extreme weather is an impact of all climatic changes. Further it also includes shifting wildlife populations and rising seas and a range of other impacts. These changes take place due to humans continue to add heat trapping greenhouse gases through their modern life style. Due to this human caused warming, the fate of the earth as we know is – farms, forests, coasts and snowcapped mountains hang in the balance. Many economic and social challenges would be faced by cities around the world which might include energy shortages, damaged infrastructure, heat related mortality and illness and scarcity of food and water. Economic losses will make it difficult to maintain livelihoods and might have to face social issues including poverty and hunger.

Keywords:

Global, Warming, Greenhouse, Climate, Carbon

Introduction

Global Warming is a major threat to mankind. The temperature of the earth rises as a result of greenhouse gases emanating from carbon dioxide (CO₂) emissions, burning of fossil fuels or deforestation. The increase in CO₂ actually began in the 1800 as a result of deforestation. This became worse with emissions caused during the industrial revolution which lead to an increase in CO₂ levels by 1900s. When the levels of CO₂ keep rising there is an increase in temperature. This happens because CO₂ remains concentrated for even hundred years in the atmosphere, due to activities like combustion of fossil fuels for electricity generation, transportation and heating.

Background

The Intergovernmental Panel on Climate Change (IPCC) which was formed in 1988 by the World Metrological Organization (WMO) and the United Nations Environment Program (UNEP) reported in the year 2013 that between the years 1880 to 2012 an approximate 0.9 Degree Celsius rise was seen in the global average surface temperature. They also reported that the global temperature could rise by about 1 –3.5 Degree Celsius by the year 2100.

Discussion

A significant social, economic and ecological damage could be the result if the global average temperature rises by more than 2 degree Celsius. The adverse impacts could be, increase in extinction of many plant and animal species, shift in the agricultural patterns and rise in the sea levels. Through the Paris agreement in 2015, a few national governments began instituting carbon reduction plans. This was a treaty which helps countries to keep global warming from rising up to 1.5 Degree Celsius in order to avoid the effects that have already been predicted. Extreme weather, is an effect of global warming has been experienced by the U.S through colder winters. The boundary between the cold North Pole air and the warm equatorial air, known as the polar jet stream can also undergo such climatic changes. Extreme weather can also lead to the formation of hurricanes and is a subject of active climatic research. Impacts of global warming could be direct and indirect to the societies and cultures around the world. Availability of agricultural products puts a severe pressure on food availability as climatic changes can directly cause an impact on crops. There is also a prediction of a severe regional water shortage. As these water stress increases we are likely to experience an unstable global food production with a decreased bio-diversity and damaged eco systems. Even the health of human beings is being affected by these climatic changes, either directly through weather patterns or indirectly through the changes in the water, air, eco-systems, food, livelihoods and infrastructure. Disruptions to daily lives means a loss of work and school days, harm to trade, transportation, agriculture, fisheries, energy production and tourism due to extreme climatic changes, leading to a loss in productivity. A mass migration due to global warming, can increase the number of climate refugees, resulting in a mass movement of people and social disruption leading to civil unrest and military intervention.

Conclusion

This research paper discusses about the impacts of global warming which could harm the generations to come unless we find a solution to maintain a moderate warming planet.

References

- Cline, W. R. (1992) The economics of global warming., The economics of global warming., Institute for International Economics, [online] Available from: <https://www.cabdirect.org/cabdirect/abstract/19941805689> (Accessed 19 October 2020).
- Anon (n.d.) The Discovery of Global Warming - Spencer R. Weart - Google Books, [online] Available from: https://books.google.lk/books?hl=en&lr=&id=-R8AAwAAQBAJ&oi=fnd&pg=PR5&dq=articles+on+global+warming&ots=Vx_EzzEMLa&sig=vfalWz7ZZnIQilY0oxBzK5Eq8O8&redir_esc=y#v=onepage&q=articles%20on%20global%20warming&f=false (Accessed 19 October 2020).

“Why employees are fearful of speaking up towards their leaders”? Evidences from National Water Supply and Drainage Board

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Abstract

Employee fear determines the longevity of employees working in the same organization. This research aims to investigate possible factors as to why employees are fearful of speaking up towards their superiors. This will be useful for businesses to get a proper understanding and knowledge about the negative impacts of employee fear.

The study uses a questionnaire survey to statistically analyze data responses gathered from 100 bottom level employees working at a state sector organization.

Findings of this research inform that authoritative discrimination, self-efficacy and relationship have a direct influence on employee fear. It is necessary to indicate that this study is based on an insignificant sample therefore, it is recommended that future researchers given with their current resources to further investigate into other factors with an even larger target audience.

Author Keywords

Employees, fear, discrimination, leaders, self-efficacy

Introduction

The world today is very hypercompetitive, and it's now come to a stage where comments and suggestions from top management aren't effective as they used to be. Edmonson (2003) stated that despite some employees willingly give their comments and suggestions but some don't, because they feel their opinion may challenge and upset the status of the organization and its leaders. As a result, they tend to simply say "yes sir" to everything without being honest and they feel the risks outweigh the benefits, thus creating a toxic environment and counter-productivity (Edmonson 2003; Chhaya, 2019).

In some organizations, leaders use fear-based leadership as a method of getting things done faster. Although there are times when leading with fear is effective but that's only for a short term and it only causes temporary immediate actions and accountability. But the biggest problem is it creates a sense of false urgency, unnecessary anxiety and a loss of productivity (Flick, 2020).

According to Fabre (2018) explained that the majority of accidents is due to the First officer either been afraid of speaking up or is intimidated of the captain's authority. As a result, whenever the captain says and it's incorrect, the First officer due to being fearful of overriding the captain will either say "yes captain" or say nothing more and thus causing an avoidable crash (Fabre, 2018).

It is therefore clear that this issue could be the same in both the private and public sector organizations. It is important to note that these issues bring in many negative impacts to the organizations such as; companies being less innovative and creative, leaders lacking situational awareness, high turnover rates, lack of unity within organizations, accidents and arguments.

In the context of Sri Lanka, only a few pieces of research have been carried out to understand the reason as to why employees are reluctant to talk the truth against the leaders. There are times when leading with fear is effective but that's only for a short term which is a common issue experienced by many employee's, but what makes this worse is while the boss intimidates them but is charming towards superiors and customers thus creating further demotivation in them in speaking up when needed (Flick, 2020). Managing employees with pressure tactics resulted in more than a 90% rise in turnover of employees, whereas using more inspirational tactics resulted in a 68% decrease in turnover (Chhaya, 2019).

Detert and Edmondson (2007) stated that employees are fearful of speaking up towards their leaders because leaders have been genuinely hostile on previous suggestions. Whenever untested assumptions are suggested they are usually led to silence as the leaders see it as unpractical. This issue is a common problem in many organizations, thus it is important for organizations to understand as to why employees are fearful and to find ways to get rid of this. Despite many researchers identified various reasons as to why there is employee fear. Many of them either blame the leader's leadership styles or the employees of being overdramatic and lacking self-belief. Despite that, neither researcher can give a proper understanding or identify common factors between employee fear and leadership and give a proper answer to this issue. Therefore, this study attempts to identify the factors resist employees speak to up to their leaders.

Research Methodology

The objective of this research is to identify the key determinants of why employees are fearful of speaking up towards their superiors. The considers authoritative discrimination, job insecurity and self-efficacy as the factors that would influence the fear of speaking while controlling for the relationship between employee and leader.

The research based on positivism uses deductive approach. The researcher uses a sample of 100 employees working in a state sector organization. The employees working in the operational department are sampled based on convenient sampling. Primary data rely on primary data collected using a structured questionnaire.

Findings

Regression analysis was performed to check the relationship between the identified factors and employee fear. The Adjusted R² value was 0.27 which means around 27% of the variation in employee fear is due to the variations in authoritative Discrimination, job insecurity, self-efficacy and relationship. The F Statistics was 10.10 which means that the model can explain the employee fear in a better way.

The beta co-efficient of authoritative discrimination was 0.23 and significant at 5 percent significance level. This implies that more the authoritative discrimination, the employees

are more afraid to talk their bosses. It could be observed that there is positive relationship between job insecurity and fear, yet the relationship was not significant. This is probably because, the sample was collected from a state sector organization where there is very little room for job insecurity. Self-efficacy reported a negative relationship with employee fear to talk and is significant at 5 percent significance level. The relationship between employee and leaders contributed to increased fear as per the results reported this could be because of the self-defensive attitude of those employees.

Managerial implications

This study provides an insight on four key determinants of employee fear and recommendations on how to the leaders in any organization should understand the negative impacts of fear and the value of employees' voices whenever leaders make their decisions and through understanding the identified determinants. Using the information from this study, future researchers will be able to build knowledge on these specific key determinants that affect employee fear.

Executives and analysts will be useful for leaders to identify ways to mitigate employee fear and this will help to improve the organization's innovation, improve their performance and reduce labour turnover rate.

The leaders can also research further on ways to improve the identified determinants in other literature to further reduce employee fear and promote then speaking up towards their superiors. Future researchers would be able to use the knowledge found in this study as a guide on indicators for employee fear.

References

Backman, M., 2020. Americans' top reasons for job insecurity, And What To Do About Them | The Motley Fool. [online] The Motley Fool. Available at: <<https://www.fool.com/careers/2019/03/24/americans-top-reasons-for-job-insecurity-and-what.aspx>> [Accessed 15 September 2020].

Backman, M., 2020. Nearly 1 In 5 Employees Has A Toxic Workplace | The Motley Fool. [online] The Motley Fool. Available at: <<https://www.fool.com/careers/2019/03/14/nearly-1-in-5-employees-has-a-toxic-workplace.aspx>> [Accessed 15 September 2020].

Harvard Business Review. 2020. Does Your Leadership Style Scare Your Employees?. [online] Available at: <<https://hbr.org/2019/07/are-your-employees-scared-of-you>> [Accessed 12 July 2020].

Harvard Business Review. 2020. Why Employees Are Afraid To Speak. [online] Available at: <<https://hbr.org/2007/05/why-employees-are-afraid-to-speak>> [Accessed 12 July 2020].

Lebel, R., 2016. Overcoming the fear factor: How perceptions of supervisor openness lead employees to speak up when fearing external threat. *Organizational Behavior and Human Decision Processes*, 135, pp.10-21.

Talent management process in an organization

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Abstract

This report critically evaluates the talent management process within an organization. The concept of talent management is defined as the methodically organized, strategic process of getting the right talent onboard and helping them grow to their optimal capabilities keeping organizational objectives in mind. The research is done in Aloy gems and jewelry PVT. The author describes how the process of talent management is been managed by the organization.

The project would be useful to the human resource management department of the selected organization. The research report will provide an analytic evaluation of how effectively the organization has managed to do the talent management process within the organization.

It was analyzed that in some situations the organization has taken correct directions to manage the talents within the organization. It was identified that adhoc strategies of the organization has decreased the value of the organization's talent management process. The researcher has concluded that the overall positive impact of the talent management process within the organization are greater than the negative impact of the current talent management process within the organization.

Author keywords

Talent management process, recruitment, retaining, motivating.

Introduction

Talent management is defined as the methodically organized, strategic process of getting the right talent onboard and helping them grow to their optimal capabilities keeping organizational objectives in mind. The process thus involves identifying talent gaps and vacant positions, sourcing for and onboarding the suitable candidates, growing them within the system and developing needed skills, training for expertise with a future-focus and effectively engaging, retaining and motivating them to achieve long-term business goals. The definition brings to light the overarching nature of talent management how it permeates all aspects pertaining to the human resources at work while ensuring that the organization attains its objectives. It is thus the process of getting the right people onboard and enabling them to enable the business at large.

Aim of the research

Aim of the research is to study the talent management process in the selected organization.

Methodology

The chosen research methodology is a qualitative method with a descriptive survey. Interviews and questionnaires have been used as the data collecting tools. The collected data has been analyzed using qualitative method. Sample was selected on a non-

probability basis. Two managerial level employees were selected for questionnaire and interview were selected for data collection. The researcher preferred to do an interview because he could collect data from verbal and nonverbal communication within an interview process. And also an interview could be easy to give the researcher a realistic feel.

The researcher has chosen Aloy gems and jewelry as the sample to complete the research. The selected organization falls under tourism sector. The main objectives of carrying out this research is to, recognize the strengths and weaknesses in talent management process within the organization and to provide recommendations on how the firm could approach the process of talent management more productively in order to make the business much more successful.

Findings

The research comprehends that the current process talent management of the organization has not supported to reach the organization's expectation level. The researcher believes that future improvements on talent management process in Aloy gems and jewelry PVT will lead the organization to achieve the goals.

In the current talent management process of Aloy gem and jewelry PVT the researcher has identified that the organization has a talented and an updated Human resource management department. The Human resource management department of the selected organization has a high awareness of the importance of an effective talent management process within the organization. The researcher also identified that the HRM department has future for plans and implementations on talent management process,

The researcher has found that the administration of the selected organization is not that much considered about the talent management process. They have knowledge on talent management, but talent management process is not that much important in their point of view. The view of the HRM department of the organization and the administrative level are different.

Conclusion and recommendation

Talent management in the organization aims at ensuring employee recruitment, training and development, motivation, performance reviews and their compensation. Working towards enhancing a good talent management system in the organization ensures these components of human resource contribute to the success of the organization. The advantages that the components bring to the organization also outweigh the disadvantages considering organizations benefit from these approaches. These ensure the organization attracts highly qualified employees and finds it easy to retain them and hence improving their human resource element. Talent management enhances reviews that prove vital in developing employees. They reveal employee weaknesses and result in the development of training needs and programs that will improve the skills of the employees hence maintaining their talents. Employee talents also develop and change with changes in the organization needs hence increasing and improving their ability to execute their roles. Therefore, the application of talent management proves an ideal approach in employee development and improving the performance of each personnel in the organization.

The overall talent management process of Aloy gems and jewelry Pvt is satisfactory. But the organization should concentrate on working on talent management process more for better results. If the organization fail to implement the current process of talent management the company will lose its demandable employees as well as it's achievements. An effective talent management process is more beneficial to the company. If the organization regrets the procedure the organization has to face issues in long term

To avoid issues the researcher is recommending Aloy gems and jewelry Pvt to, The company could implement an effective strategy to retain employees as well as to attract talents towards the organization

The administration could give preference to human resource management to take forward an effective talent management process

The organization could allocate finance for training sessions more than previous years Company has to think the employees as important assets and has to treat them with facilities than how to motivate them

Very specially the administration could consider to create a proper working culture inside the organization so that it will help to decrease employee dissatisfaction

The organization can change the organizational structure in a flexible manner so that employees can feel free to come up with their ideas as well as issues

A good reward system can encourage employees to be more efficient on work

References

Anon., 2018. How to Improve the Talent Management Process. [Online]
Available at: <https://www.cornerstoneondemand.com/resources/articles/how-improve-talent-management-process/>
[Accessed 2 October 2020].

Dock, N., n.d. Conclusion Talent management in an organization aims at ensuring employee | Course Hero. [Online]
Available at: <https://www.coursehero.com/file/p1to4ird/Conclusion-Talent-management-in-an-organization-aims-at-ensuring-employee/>
[Accessed 2 October 2020].

Ghosh, P., 2019. What is Talent Management? Definition, Strategy, Process | HR Technologist. [Online]
Available at: <https://www.hrtechnologist.com/articles/performance-management-hcm/what-is-talent-management/>
[Accessed 1 October 2020].

Manpreet, P. a., n.d. Advantages & Disadvantages - TALENT MANAGEMENT. [Online]
Available at: <https://talentmanagemnt.weebly.com/advantages--disadvantages.html>
[Accessed 2 October 2020].

Talent management process in an organization

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Abstract

This report is about how talent management process in an organization. Talent management is defined as the methodically organized, strategic process of getting the right talent onboard and helping them to grow to their optimal capabilities keeping organizational objectives in mind. The research was done upon Jetwing Viluyana. The author describes about how talent management is carried out in Jetwing Viluyana.

The project will be useful for the management level employees in research and development department of the selected organization. This research report will provide an analytic evaluation of how effectively the company uses the talent management process.

Author keywords

Talent management, Hotel, Talent management process, planning, training, development, retaining

Introduction

Talent management is defined as the methodically organized, strategic process of getting the right talent onboard and helping them grow to their optimal capabilities keeping organizational objectives in mind.

The process thus involves identifying talent gaps and vacant positions, sourcing for and onboarding the suitable candidates, growing them within the system and developing needed skills, training for expertise with a future-focus and effectively engaging, retaining and motivating them to achieve long-term business goals. The definition brings to light the overarching nature of talent management – how it permeates all aspects pertaining to the human resources at work while ensuring that the organization attains its objectives. It is thus the process of getting the right people onboard and enabling them to enable the business at large.

Under talent management there are different elements and processes that need to work in to ensure the success of the organization, if one process fails the whole organization crumbles down.

Aim of the research

Aim of the research is to find out the talent management process in Jetwing Viluyana

Methodology

The chosen research methodology is Qualitative method with case study, interview and questionnaire has been used as the data collection tools. The collected data has been analyzed using qualitative method, two managerial level employees were selected for

the questionnaire and interview process which was used for data collection.

The researcher has chosen Jetwing Viluyana as the sample to complete the research. The selected organization falls under Hotel and tourism sector. The main objective of carrying out this research is to find out how an organization talent management process is carried out in stages.

Findings

As per the findings Talent management process is a vital part in the hotel, as per the answers that was gained through the interview and the questionnaire the researcher was able to find out that the samples that was selected had a good knowledge about the talent management process, moreover the hotel uses a strategic plan to recruit employees it was mainly used to make the hiring process easier and also to find more qualified talent. The hotel advertises job advertisements through social media and newspaper articles. Furthermore, the hotel attracts talent by promoting their brand “Jetwing”, culture, monetary benefits and retirement benefits.

The hotel conducts an induction program to welcome new employees and to introduce the new employees to their coworkers. Moreover, the hotel gives training for their employees which helps them to adopt new skills that might help them to work well. As per the gained answers through the samples the employees are encouraged by the hotel to participate in these training sessions. Furthermore, the hotel conduct skill development programs to the newly hired employees and the employees who are currently working for the hotel. The culture of the hotel is very welcoming to the employees, the employees get to share their thoughts freely without getting discriminated all the employees are getting treated equally. The hotel uses many retention strategies to retain their talented workforce some of them are Retirement benefits, Healthcare benefits, employee recognition, ETF/EPF, seasonal bonuses and hotel discounts. All the employees at Viluyana has agreed to the transitioning policies as per the given answers by the samples the employees are pretty much happy about the transitioning policies of the company.

Conclusion and recommendations

The process of talent management has done a huge impact to the hotel, the hotel uses talent management process professionally. The selected samples had a good knowledge about the talent management process.

Using of talent management process helped the hotel to select and recruit the best employees for the right job. Overall, the hotel has induction programs, training programs and skill development programs to keep the employees updated with new skills.

The hotel uses many strategies to retain their employees and has good transitioning policies which the employees are satisfied with, overall, the hotel is very welcoming and a place where every employee is treated equally.

The researcher recommended to add more stages to the selection process as the selection process lacks few crucial stages. Moreover, a job description and a job specification would be help full when advertising jobs. Furthermore, the researcher recommended to host parties and trips as this will help the employees to introduce each

other also will help to make great bonds between employees. training employees to perform multiple tasks will help the hotel to run smoothly.

References

Ghosh, P., 2019. hrtechnologist. [Online]

Available at: <https://www.hrtechnologist.com/articles/performance-management-hcm/what-is-talent-management/>
[Accessed 2020].

Available at: <https://inside.6q.io/employee-motivation-important/>
[Accessed 2 october 2020].

Hieronimus, F. a. S. K. a. S., 2005. research gate. [Online]

Available at: https://www.researchgate.net/publication/265399208_The_Using_branding_to_attract_talent/citation/download
[Accessed 30 september 2020].

Mella, A., 2018. Research gate. [Online]

Available at: https://www.researchgate.net/post/what_is_the_strategic_link_between_HRD_and_talent_management/5b7c5b78b93ecd484e5b08cc/citation/download.
[Accessed 25 september 2020].

Effect of Workforce Diversity on Employee Performance

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Abstract

This report critically evaluates the effect of workforce diversity on employee performance on large scale pioneer in banking sector in Kandy District. Two concepts were thoroughly discussed throughout the entire project. Firstly, the concept of workforce diversity which is defined as the similarities and differences among employee in terms of age, gender, ethnicity, educational qualifications and cultural background. Secondly, employee performance is the way in which workers behave in the workplace and how good are they while performing duties assigned to them. The impact workforce diversity on employee performance has been described under three different variables namely; Gender, educational qualification, and ethnicity by the author.

This project would be useful to the interns and junior executives of the selected organization. It has been studied that the overall positive impacts are greater than the negative impacts experienced by Commercial Bank Gampola.

Author Keywords

Workforce Diversity, Employee Performance, Gender, Educational Qualification, Ethnicity

Introduction

Diversity is gradually seen and used as an organizational resource where the goal is to be an employer of choice, to provide outstanding customer services and to maintain a competitive customer service. The purpose of applying workplace diversity is to make employees see the big picture and contribute to attain it through their ideas and perspectives. The drive for employee performance is to set performance targets for each employee and the company as a whole. As a result, this organization's business offers good value to its customers, minimizes waste and operates competently.

Aim of the research

The aim of the study is to analyze the effect of employee diversity on employee performance at Commercial Bank, Gampola.

Methodology

To conduct the research, the Saunder's Onion research model was used. This research model consists of six stages namely, the philosophies which comprises of four types, approaches is of two types, research method consists of three divisions, strategies used, time horizons of two types and techniques and procedures.

The preferred project methodology is mono-quantitative method with an expressive survey, and questionnaire as the data collection tool. A sample size of thirty was expected but due to certain reasons, the researchers was unable to get at all the thirty employees, therefore was able to finish it with only twelve employees. The main objectives of carrying

out this research is – one, to determine the effect of gender on employee performance, two, to determine the effect of educational qualifications on employee performance and three, to determine the effect of ethnicity on employee performance at the leaders in banking sector.

Findings

Through the research, it is understood that women are equally participating at all positions as they are not considered less skilled and less qualified for many jobs in the organization. Also necessary safety measures are implemented for women who work during night shifts. About 83% of the employees have agreed to the statement that presence and acknowledgement of women can encourage individual and organizational performance. Also, we have found out that equal opportunities are given in decision making and training programs. Dissimilarity in gender and favouration towards a particular gender cannot be seen in this organization. As gender diversity is considered as one of the top priorities in Commercial Bank, Gampola it correlates with employee performance.

Lack of confidence, prejudice among employees and personality traits experienced due to educational background was disclosed by the authors. Hence, working with colleagues with different educational backgrounds improves problem solving, decision making and encourages positive relationship among employees. It can also be clearly stated that, there is no negative connection between educational diversity and the top management in Commercial Bank, Gampola when a particular decision is made. Even though highly educated employees can be bossy and dominating they do not make the other employees uncomfortable. Moreover, managers look out for individuals with educational background for managerial staff but it does not only require a diploma level qualification for the recruitment of minor staff. Similarities in the educational level of employees increase the turnover rates.

Motivational programs, promotions given to employees and reward system are not being conducted in order to understand ethnic diversity in Commercial Bank, Gampola. Using different languages to communicate in the workplace enhance group formation and cohesion, and do not inspire conflicts between employees. Working as a team that includes different ethnicities help finish a given task on time, develops decision making ability and cooperation. The authors were able to observe that ethnic diversity is never a problem at Commercial Bank, Gampola. And also it is one of the reasons why this organization has become pioneers in this sector.

Conclusion and Recommendations

The research is mainly focused on the influence of having a diverse workforce on the performance of employees in the organization. According to the data analysis, it is being concluded that Commercial Bank Gampola does have an idea on workforce diversity and employee performance and also how to deal with such situations. The more there is gender, ethnic and educational qualification diversities the more it boosts the organization's success. Therefore, it can be said that there is a significant relationship between gender diversity and employee performance, educational qualification and employee performance and ethnicity and employee performance.

Accordingly, it can be recommended that it is best if Commercial Bank Gampola can organize training programs and awareness sessions to overcome gender discrimination. Creating more opportunities to work in groups-like; projects, group targets can develop higher opinions among other employees.

Furthermore, Commercial Bank Gampola can encourage its employees to gain more knowledge not only in the banking sector but more about the world because, knowledge in only one field does not help at all and not stopping at diploma or degree levels. Also employees' self-confidence should be improved by meditation and yoga practices.

Additionally, in the researchers' point of view it would be better if employees are encouraged to learn about different cultures as this will lead to strong relationships in the workplace. Encouraging team work and leadership to create a positive work culture will produce creative outcomes.

Equality and diversity in workplace is as important aspect of workforce diversity. And if they are properly followed by an organization, then the employees' performance will escalate amazingly. The organization will see success and growth without fail.

References

Anon., 2020. Commercial Bank of Ceylon PLC. [Online]
Available at: <https://www.combank.net/newweb/en/about-us>
[Accessed 20 April 2020].

Donoho, A., 2019. Bizfluent Companies. [Online]
Available at: <https://bizfluent.com/facts.7218608-employee-performance-definition.html>
[Accessed 15 February 2020].

Saxena, A., 2014. Workforce Diversity: A Key to Improve Productivity. *Procedia Economics and Finance* , Volume 11, pp. 76-85.



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An Exploratory Analysis on Multi-Decadal Forest-Cover Dynamics in the Dry Zone of Sri Lanka: Patterns and Drivers of Forest-Cover Changes with Insights for Environmental Policy Reforms

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Keywords

spatiotemporal change; forest dynamics; remote sensing; dry zone; Sri Lanka.

Introduction

Despite multifaceted environmental values, extraction-based commercial ventures have substantially altered forested landscapes throughout the history of human civilization (Laurance, 1999, Brooks et al., 1997). The consequent extensive deterioration has been documented worldwide, which is much notable in the tropical realm, such as Sri Lanka (Reddy et al., 2017). Limited research has addressed forest cover change

in Sri Lanka, however, most such studies focused on the wet zone (Pallewatta et al., 2015). Our objectives herein were to produce a forest cover map for 2019; analyze the spatiotemporal forest cover dynamics from 1992 to 2019; and determine the drivers of the forest-cover changes, focusing Sri Lanka's DZ.

Background & Literature Survey

At global scale, the Millennium Ecosystem Assessment (2015) estimated a 6% loss of natural, global forest cover from 1990 to 2015. Although robust quantifications of forest dynamics are needed to promote conservation, data deficiencies have long impeded such actions in Sri Lanka. Forest cover changes in Sri Lanka are complicated, particularly due to multiple land-use transitions. Large-scale forest cover losses in Sri Lanka have been attributed to plantation agriculture, slash-and-burn farming, and rural settlement programs (Jones et al., 1998, Gunatilake, 1998, FAO, 2010). In 1956, nearly half of the island had forest cover, followed by rapid forest depletion in subsequent decades. Nearly two-thirds of Sri Lanka falls within the DZ, which contains the most extensive forests of Sri Lanka (FAO, 2010). During the recent decades (1992 to date), human resettlements, agricultural encroachments, and infrastructure development have driven substantial forest losses in the DZ, while multiple dry-zone areas have been identified as deforestation hotspots (Erdelen, 1988).

Research Methodology / Materials and Methods

We used medium-resolution (30 m) landsat-8 imagery to classify the forest cover in the DZ for 2019. The methods we adopted followed four main steps: pre-preparation of the Landsat images with Google Earth Engine; forest cover classification for 2019 via the supervised classifications methods with follow-up accuracy assessments; acquisition and pipelining secondary data layers available through standard GIS data formats; and calculating forest-cover changes. We adopted a binary classification scheme, forest versus non-forest, based on four supervised machine learning algorithms (support vector machines, neural networks, random forest, and K-nearest neighbor) developed via the open-source software R. Subsequently, we selected the machine learning method with both the best prediction performance and the highest accuracy to finalize our product.

Results and Discussion

The DZ had undergone rapid forest loss (246,958.4 ha) during the past 27 years, which accounts for 8.0% of the net forest cover changes. From 2010 to 2019, the rates of forest loss were high, which can be associated with the rapid infrastructure development. In general, Sri Lanka's intensively commercialized agrarian economy and short-sighted unsustainable socio-economic development schemes are the culprit behind the forest loss, which transformed Sri Lanka's rural landscapes into monocultures. Our results revealed that the dry zone of Sri Lanka had undergone considerable forest loss over the past three decades with net forest losses amounting to 246,958.4 ha. The forest area gained in the same region for this timeframe was much lower (162,676.6 ha) in comparison to gross forest loss (409,635.0 ha). As such, forest regeneration (6,025.1 ha yr⁻¹) only compensated for less than half the forest losses (15,171.7 ha yr⁻¹). However, the forest cover dynamics in the dry zone of Sri Lanka are complicated, non-deterministic, non-uniform across the DZ landscapes. Our findings can be a blueprint to reform current forest policies and enhance forest sustainability of Sri Lanka's dry zone.

References

- BROOKS, T. M., PIMM, S. L. & COLLAR, N. J. 1997. Deforestation Predicts the Number of Threatened Birds in Insular Southeast Asia: La Extensión de las Deforestaciones Predice el Número de Aves Amenazadas de Extinción en las Islas del Sureste de Asia. *Conservation Biology*, 11, 382-394.
- ERDELEN, W. 1988. Forest ecosystems and nature conservation in Sri Lanka. *Biological Conservation*, 43, 115-135.
- FAO 2010. Global forest resources assessment 2010 country report Sri Lanka. The Forest Resources Assessment Programme, FAO Forestry Department, Rome, Italy.
- GUNATILAKE, H. M. 1998. The role of rural development in protecting tropical rainforests: evidence from Sri Lanka. *Journal of Environmental Management*.
- JONES, J. P. G., FERRY, C. D., ISHERWOOD, C. E., KNIGHT, C. G., KUMARA, C. L. & WEERAKOON, K. 1998. A conservation review of three wet zone forests in south-west Sri Lanka. CSB Conservation Publications, Cambridge, UK.
- LAURANCE, W. F. 1999. Reflections on the tropical deforestation crisis. *Biological Conservation*.
- PALLEWATTA, N., LOKUPITIYA, E., MANAWADU, L. & RANWALA, S. 2015. Drivers of Deforestation and Forest Degradation in Sri Lanka : Assessment of Key Policies and Measures Report on Drivers of Deforestation and Forest Degradation in Sri Lanka : Assessment of Key Policies and Measures Sri Lanka UN-REDD Programme.
- REDDY, C. S., MANASWINI, G., JHA, C. S., DIWAKAR, P. G. & DADHWAL, V. K. 2017. Development of National Database on Long-term Deforestation in Sri Lanka. *Journal of the Indian Society of Remote Sensing*, 45, 825-836.

Study of Selected Water Quality Parameters and the Cohabiting Fish Species in Sri Jayewardenepura Canal System

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Abstract

The Colombo -Sri Jayewardenepura canal system which is a part of the Diyawanna Oya canal network which is a man-made canal system located on the left bank of the lower valley of Kelani Ganga. This canal network is also important as a major flood detention zone in the city of Colombo and average depth of the canal system is about 1.5 meters. It may vary seasonally due to heavy sedimentation of silt and bank erosion in the rainy season and it gets frequently clogged with floating weeds & dumps (polythene, plastics & domestic wastes). It has been found that 43.5% of the families in the study area dump their household garbage into the marsh. In order to do this, it is important to know the water quality factors that affect the successful survival of fish species in this waterbody. The present study was carried out to investigate the selected water quality parameters and cohabiting fish species in this canal system, which is a heavily polluted urban waterbody located in Colombo district. Fish and water sampling were carried out at 6 sampling locations (3 sampling points at each location) once a month, from January 2016 to December 2017. Water quality parameters investigated were pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Electrical Conductivity, Temperature, Hardness, Alkalinity, Nitrate-Nitrogen (NO₃-N) and Phosphate (PO₄ 3-). Water flow rates and water depths of all sampling points were also recorded. Fish species were identified and relative densities of each fish species were calculated in wild population of Sri Jayewardenepura canal system.

Seven fish species, namely, *Poecilia reticulata* (Guppy), *Puntius bimaculatus* (Ipili Kadaya), *Aplocheilichthys parvus* (Uda handaya), *Trichopodus trichopterus* (Three spot gourami), *Oreochromis mossambicus* (Mozambique Tilapia), *Oreochromis niloticus* (Nile Tilapia) and *G. affinis* (Mosquito fish) were identified in this canal system. *P. reticulata* was found to be the most abundant species in all sites. Water quality parameters observed revealed that all the sites have been subjected to moderate or high pollution and most conspicuous were the low DO (ranged between 0.83 - 2.33mg/l) and high BOD (3.86 - 8.32mg/l) levels. While DO has reached levels potentially harmful for fish, BOD levels indicated organic pollution leading to an abundance of oxygen-requiring micro-organisms in the water. Polluted water quality of study locations were further confirmed by high values for Nitrate-Nitrogen (NO₃-N) (3.85 - 10.455mg/l), Phosphate (PO₄ 3-) (1.90 - 3.19mg/l), Electrical Conductivity (224 - 892 μ S/cm), Hardness (80.0 - 127.92mg/l) and Alkalinity (70.67 - 179.17mg/l). Despite the fact that the locations were polluted, relative densities (32.7 \pm 27.7 - 85.7 \pm 22.9) of *P. reticulata* were considerable in all locations. indicating their ability to breed and survive adverse environmental conditions. However, results of the study also revealed that the relative densities of fish species varied with some of the water quality factors and also this may be an indication that these adverse water quality conditions are affecting their population densities.

Keywords: Fish species, Fish density, water quality parameters, Polluted water

Introduction

This canal system in and around Colombo-Sri Jayewardenepura area is currently in an environmentally deteriorated condition due to rapid development and urbanization of the area. The quality of water and aquatic habitats in this canal system are influenced by industrial and public effluent discharge to the canal system. The average depth of the canal system is about 1.5 meters. It may vary seasonally due to heavy sedimentation of silt and bank erosion in the rainy season and it gets frequently clogged with floating weeds & dumps (polythene, plastics & domestic wastes). It has been found that 43.5% of the families in the study area dump their household garbage into the marsh (Colombo Flood Detention Areas, 1995). Present study was carried out in some selected locations in the Colombo -Sri Jayewardenepura canal system which is a part of the Diyawanna Oya canal network which is a man-made canal system located on the left bank of the lower valley of Kelani Ganga. This canal network is also important as a major flood detention zone in the city of Colombo (Colombo Flood Detention Areas, 1995). It is situated in the Western province, Colombo district of Sri Lanka, latitudes 6 52' 55" - 6 55' 45" N and longitudes 79 52' 35" - 79 55' 15" E .The overall objective of the present study was to investigate the selected water quality parameters and identifies fish species of this ecosystem were studied.

Materials and Method

Present study was carried out covering approximately 15km of the canal network. Six locations were selected considering habitat characteristics. Three sites from each location were selected for data collection. Sampling was carried out once a month from January 2016 to December 2017 between 8.00 am to 2.00 pm. Three sampling points covering different habitats in each location were sampled for all selected water quality parameters. Three replicates were taken from each sampling point and average values were considered (Wetzel & Likens, 2000). Water was sampled at the mid layer of the water column. Selected water quality parameters were measured using standard procedures (APHA, 1999), Fish samples were collected at each sampling site at each month, using a hand net and a gill net. Fish were separated according to the genus or species levels and counted. The relative densities of fish were calculated using the following formula;

$$\text{Relative Density} = \frac{\text{Catch by sampling gear}}{\text{Sampling effort}}$$

Results

Table1 depicts the mean values recorded for selected water quality parameters at six sampling locations in Sri Jayewardenepura canal system during the study period (monthly sampling for 24 months).

Of the environmental parameters studied, mean dissolved oxygen (DO) ranged between 0.83 ± 0.12 - 4.84 ± 0.76 (mg/l). These values in the locations were less than the recommended values for fish and aquatic life (minimum 5 mg/l) (CEA, 2017). Mean biological oxygen demand (BOD) ranged between 1.78 ± 0.4 - 9.10 ± 0.6 (mg/l) and except two locations (L3 and L6), BOD values in other locations were higher than the

recommended values for fish and aquatic life (maximum 4 mg/l) (CEA, 2017). Mean Nitrate-nitrogen (NO₃-N) ranged between 3.9±0.8 - 11.5±1.2 (mg/l). Location L6 always recorded values higher than the recommended value for fish and aquatic life (maximum 10mg/l) (CEA, 2017) but in other locations these values were within the limits or close to the maximum limit. Mean Phosphate (PO₄ 3-) ranged between 1.9±0.4 - 3.9±0.3 (mg/l) and these values in the locations were much higher than the recommended values for fish and aquatic life (maximum 0.4 mg/l) (CEA, 2017). Mean electrical conductivity of water ranged between 257.6±12.8 - 801.6±42.0 (µs/cm). These values in some locations were higher than the recommended values for fish and aquatic life (500 µs/cm) (Awoyemi et al 2014). Mean alkalinity ranged between 70.7±11.5 - 179.6±20.4 (mg/l) and these values in the locations were within the recommended values for fish and aquatic life (5-500 l/ mg) (Lawson, 1995). Mean hardness ranged between 80.0±10.4- 113.3±13.1 (mg/l) and these values in the locations were within the recommended values for fish and aquatic life (20-300mg/l). (Boyd and Walley, 1975, Romaine, 1985). Mean flow rate of the study locations over the 24-month period varied between 0.011±0.009 - 0.056±0.064 (m/s) while the mean depth was between 1.02±0.48 - 0.34±0.10 (m).

The cohabiting fish species in Sri Jayewardenepura canal system.

Observation on fish species at six sampling locations in Sri Jayewardenepura canal system during the study period given in Table 2.

Seven fish species, namely, *Poecilia reticulata* (Guppy), *Puntius bimaculatus* (Ipili Kadaya), *Aplocheilichthys parvus* (Uda handaya), *Trichopodus trichopterus* (Three spot gourami), *Oreochromis mossambicus* (Mozambique Tilapia), *Oreochromis niloticus* (Nile Tilapia) and *G. affinis* (Mosquito fish) were identified. At one study location (Location 6), all species except *G. affinis* were found. *P. bimaculatus* and *A. parvus* were only recorded from this location throughout the study period. When compared, relative density of *A. parvus* (7.2±1.23) was higher than that of *P. bimaculatus* (2.9±0.74). *O. niloticus* co-exist with *P. reticulata* and *O. mossambicus* in three locations but their relative density was lower than that of *O. mossambicus* and *P. reticulata*. *T. trichopterus* co-exist with *P. reticulata* and *O. mossambicus* in two locations but their relative density was also lower than that of *P. reticulata* and *O. mossambicus*.

Discussion

The study area recorded some water quality parameters that are not suitable for fish and aquatic life. One of the most important factors was dissolved oxygen (DO) which ranged between 0.83±0.12 - 4.84±0.76 (mg/l), which was less than the recommended minimum of 5 mg/l for fish and aquatic life (CEA, 2017). Except two locations, the Biological Oxygen Demand (BOD) (1.78±0.4 - 9.10±0.6 mg/l) also has exceeded the maximum recommended level for fish and aquatic life, 4 mg/l (CEA, 2017). Both these parameters and high phosphate (1.9±0.4 - 3.9±0.3 mg/l) (maximum 0.4 mg/l) values indicate the polluted state of the water body under investigation.

There are some important observations made in this study. It was observed that, among the selected sampling locations in the natural environment, there was a comparatively lower population of *P. reticulata* in one location and there were 5 species co-existing with *P. reticulata*. Of these species, *Aplocheilichthys parvus* (Uda handaya) is an endemic

species (Goonatilake, 2007) and *Puntius bimaculatus* (Ipili Kadaya) which was earlier considered as an endemic species but now has found to occur in India (Goonatilake, 2007). The other three species, namely, *Trichopodus trichopterus* (Three spot gourami), *Oreochromis mossambicus* (Mozambique Tilapia), *Oreochromis niloticus* (Nile Tilapia) are exotic species brought to the country as food fish (*O. mossambicus*, *O. niloticus*) or as ornamental fish (*T. trichopterus*). This particular location in which these fish species were occurring had similar environmental parameters as the other sampling location, thus the co-existence of five species with *P. reticulata* could be related to the low population density of *P. reticulata* indicating that, when densities of *P. reticulata* are high, they can interfere with co-existing species.

Conclusions

Water quality parameters observed revealed that all the sites have been subjected to moderate or high pollution, the study area recorded some water quality parameters that are not suitable for fish and aquatic life and *P. reticulata* in high densities in the polluted water body under investigation shows their ability to withstand extreme water conditions.

Acknowledgement

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References

- APHA, Standard Methods for the examination of water and waste water, 20th ed. Washington DC, American Journal of Public Health, 1999; vol.2, pp.541-562.
- BOYD CE, WALLY WW. "Total Alkalinity and Hardness of Surface Waters in Alabama and Mississippi." Alabama Agricultural Experiment Station Bulletin no. 465. Birmingham, Ala.: Auburn University Press;1975
- Colombo Flood Detention Areas, Wetland sites report. Central Environmental Authority. Wetland Conservation Project , Sri Lanka;1995
- Final draft of ambient water quality standard and the category. Central Environmental Authority, Revised on 2 nd committee meeting (CEA);05/04/ 2017
- GOONATILAKE, S DE A. Freshwater Fishes of Sri Lanka. Ministry of Environment and Natural Resources, Sri Lanka.; 2007; 147pp.
- LAWSON TB. Fundamentals of Aquacultural Engineering. New York: Chapman and Hall;1995

Table 1: Monthly mean values recorded for selected water quality parameters at six sampling locations in

Sri Jayewardenepura canal system during 2016 and 2017

Year	SL	Environment parameters										
		Mean Water Temperature (C°)	Mean pH	Mean Electric Conductivity (µs/cm)	Mean Dissolved Oxygen (DO) (mg/l)	Mean Biological Oxygen Demand (BOD) (mg/l)	Mean Nitrate-nitrogen (NO ₃ -N) (mg/l)	Mean Phosphate (PO ₄ ⁻³) (mg/l)	Mean Alkalinity (mg/l)	Mean Hardness (mg/l)	Flow rate (m/s)	Mean Depth (m)
2016	L ₁	30.2±1.6	7.6±0.2	800.3±43.5	0.88±0.07	5.99±0.7	9.3±0.9	2.8±0.4	70.7±11.5	80.0±10.4	0.015±0.023	0.45±0.10
	L ₂	30.4±1.2	8.0±0.4	579.3±75.3	0.83±0.12	8.32±0.5	9.5±0.9	3.5±0.4	179.2±17.3	96.0±13.5	0.013±0.013	0.48±0.14
	L ₃	30.6±0.9	7.6±0.7	270.7±11.2	2.33±0.39	2.52±0.3	3.9±0.8	1.9±0.4	148.9±20.6	92.4±20.7	0.026±0.024	0.34±0.10
	L ₄	29.9±1.1	8.3±0.4	509.5±29.4	0.99±0.11	8.67±0.7	9.0±1.2	3.2±0.3	171.2±15.2	105.3±31.3	0.018±0.011	0.34±0.08
	L ₅	30.5±0.9	6.6±0.2	281.0±16.1	1.51±0.23	4.92±0.5	4.6±0.6	3.0±0.3	160.4±15.2	127.9±8.1	0.011±0.009	0.46±0.09
	L ₆	30.8±0.9	7.3±0.3	257.6±12.8	4.70±0.76	1.78±0.4	11.1±1.1	3.5±0.4	126.3±7.1	105.8±14.4	0.017±0.015	0.61±0.11
2017	L ₁	30.6±1.5	7.3±0.3	801.6±42.0	0.87±0.07	6.09±0.6	9.7±0.7	2.9±0.3	77.2±12.2	80.0±9.5	0.056±0.064	1.02±0.48
	L ₂	30.5±1.2	7.8±0.7	570.6±74.5	0.85±0.10	8.34±0.5	10.2±0.6	3.8±0.5	179.6±20.4	95.5±13.3	0.016±0.015	0.49±0.16
	L ₃	30.3±1.1	7.4±0.7	271.6±11.6	2.40±0.40	2.77±0.4	4.2±0.7	1.9±0.4	151.5±20.0	92.4±19.7	0.023±0.015	0.38±0.10
	L ₄	30.1±1.1	7.8±0.7	519.6±38.4	1.02±0.12	9.10±0.6	9.8±0.9	2.9±0.3	168.8±12.6	113.3±13.1	0.018±0.011	0.35±0.09
	L ₅	30.8±1.1	6.7±0.3	297.9±45.6	1.58±0.19	5.35±0.5	4.9±0.6	3.0±0.4	162.6±12.7	129.0±9.6	0.013±0.009	0.49±0.10
	L ₆	30.9±0.9	7.3±0.3	262.1±12.1	4.84±0.76	1.83±0.4	11.5±1.2	3.9±0.3	125.0±9.1	106.6±13.5	0.019±0.018	0.62±0.13

L₁- Attidiya, L₂ – Bellanwillla, L₃ – Rattanapitiya, L₄- Nawala, L₅-Near Parliament grounds, L₆- Jayewardenepura hospital road

Table 2: Fish species and relative densities at six sampling locations in Sri Jayewardenepura canal system during the study period

Location	Fish species						
	<i>P. reticulata</i>	<i>P. unitus</i> <i>bimaculatus</i> (Ipili Kadaya)	<i>Aplocheilichthys</i> <i>parvus</i> (Uda handaya)	<i>Trichopodus</i> <i>trichopterus</i> (Three spot gourami)	<i>Oreochromis</i> <i>mosambicus</i> (Mozambique Tilapia)	<i>Oreochromis</i> <i>niloticus</i> (Nile Tilapia)	<i>Gambusia</i> <i>affinis</i> (Mosquito fish)
L ₁	RD	RD	RD	RD	RD	RD	RD
L ₁	32.7±27.7	NR	NR	NR	3.75±0.62	2.75 ±0.87	NR
L ₂	84.9±25.6	NR	NR	2.1 ±0.74	12.33±2.71	4.25±0.97	NR
L ₃	78.0±24.9	NR	NR	NR	2.5±0.67	NR	19.83±6.63
L ₄	46.6±18.9	NR	NR	NR	2.25±0.45	NR	NR
L ₅	55.6±12.2	NR	NR	NR	4.42± 1.17	NR	NR
L ₆	9.0±2.3	2.9±0.74	7.2±1.23	1.3±0.48	4.92 ±0.99	1.67±0.65	NR

Man and Music: Through the Ages

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Abstract

Music is a universal language, an art that has penetrated through human society. In the past it has been very important for rituals and dramas and has been able to reflect and influence on human emotion. Music is a subject which is pleasurable in its self, and its influence can travel beyond amusement. Music has many activities such as listening, singing, playing, composing and improvising in different angles. Through this people can express their feelings to everyone.

Researches had been carried out in the field of music sciences which had identified that it could be positively affect the psychological, social and emotional aspects of human life. The social component of music may also have an impact on social skills of a human beings, supporting and encouraging the individuals to take part in collective and collaborative music events. Participation in music fosters many kinds of inter-cultural, inter-generational and disability issues. Further we could mention, music combines vocal and instrumental sounds, for emotional expression according to the rhythm and melody. According to Jeremy Montagu of the University of Oxford, he mentioned that "music is a sound that conveys emotions". Our ancestors could have created the basic music by clapping their hands, and the original musical instruments were made of wood and reeds. There are evidence that people struck rock gongs in caves around 12,000 years ago and this shows that music is an ancient, and could have been with the first human being that evolved.

There are many functions relating to music like dancing, entertainment which could be personal or public. Music was also used for communication in different rituals and cultures of the human society which could be differentiated through the various music.

However music brings people together. "Music leads to bonding such as the bonding between mother and child or bonding's between groups", explains Montagu. Workers could be kept happy in spite of their boring and repetitive work schedule through music, as it helps to increase the force of their work and keeps everyone moving together. He also concludes "it has even been suggested that music, in causing such bonding created not only the families but societies itself, bringing individuals together who might otherwise have led solitary lives".

The study on music through the ages deals with style, form, types of music, when they were composed, how they are developed and who were responsible for it. The history of music has been divided into different periods such as medieval, renaissance, baroque, classical, romantic and modern. The musical periods fits into an approximate time frame. Music of the medieval 1150-1400 was noted on manuscripts and came from churches or places connected to the church. Therefore most pieces have a religious subject.

The type of music of this period is the Gregorian chant which was monophonic in style. Stable and Landini are some composers of this period. 1400-1600 the

period of Renaissance focuses on choral music. Religious music, such as, Masses, Anthems, Psalms and Motets flourished during this period. Towards the end of this period some composers adapted sacred music. Downland and Gibbons are some notable composers.

Keywords

Music, Period, Style, Composer, Instruments

Discussion

Historians have divided the history of music into four main periods such as, Baroque, Classical, Romantic and Modern excluding the Medieval and Renaissance period. The years 1600-1750 known as the Baroque period, was closely connected with the church. Most musicians worked as servants of the Royal court, writing dances and music for concerts and royal ceremonies, while church musicians wrote instrumental and vocal music for Holy services and masses. Music of this period had fancy decorations and a great deal of ornamentation. The most significant feature of this period was known to be polyphonic and contrapuntal. Instruments such as Organ, Harpsichord and Clavichord were mainly used. Bach, Handel and Scarlatti were the main composers of this period. During the Classical period 1750-1820, instrumental music reached a height, never known before. This was the Sonata. The home of the classical period was Vienna, where most of the great composers of this period were born, Haydn and Mozart. The system of patronage also known as the style gallant, tied down the musicians to the service of an aristocratic employer. Beethoven a German composer broke away from this system and made way for the composers to be independent, and therefore he came to be known as the bridge between the Classical and Romantic period. Music of this period was Homophonic in nature and the use of the Alberti bass was prominent. Operas were composed during this period and it appeared in two forms, Opera Seria and Opera Buffa. The harpsichord was replaced with the piano and orchestras increased in size range and power.

Romantic Period 1820-1900 departed from the traditional style and composers put their own feelings and thoughts into music. A romantic period piece which depends on strong emotional expression, which was generated through richness of harmony and dramatic occasion. The rubato style was employed by composers like Chopin, Liszt which was the main feature of this period. Instrumentation was more prominent as orchestras. Public concerts and operas moved from the hands of royal and rich into the hands of the urban middle class giving a chance for all to enjoy. It was during this period where national schools commenced. The latter part was influenced by impressionism which was a strong, direct dramatic expression, a term borrowed from painting. Debussy and Ravel used vague outlines of melody and rhythm, soft colorful tones and shimmering effects to paint their pictures with music. Impressionistic composers used descriptive titles to their music.

The modern period which belongs to the 20th and 21st century can be described as a free reign for composers. The use of saxophone, syncopated rhythm, swung quavers, improvisation, unusual sound effects are the features of the music of this period. A blue note referred to in jazz music is a type of slow sad American Negro song. Gershwin and Ellington were some main composers.

Conclusion

Music is a medicine that reconciles the tensions due to any stress and also pandemic period.

“Music is a language that does not speak in particular words. It speaks in emotions, and if it’s in the bones, it’s in the bones”. -Keith Richards

References

Montagu, J. (2017) How Music and Instruments Began: A Brief Overview of the Origin and Entire Development of Music, from Its Earliest Stages, *Frontiers in Sociology*,

Frontiers, 2, [online] Available from: <https://www.frontiersin.org/articles/10.3389/fsoc.2017.00008/full> (Accessed 20 October 2020).

Anon (n.d.) The origins of music: Evidence, theory, and prospects - Anton Killin, 2018, [online] Available from: <https://journals.sagepub.com/doi/full/10.1177/2059204317751971> (Accessed 20 October 2020).

Anon (n.d.) History of Music, [online] Available from: <http://method-behind-the-music/history/history/> (Accessed 20 October 2020).

Assessment Of Groundwater Hydro-Geochemical Facies Using Graphical Tools In Girandurukotte Area, Sri Lanka

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Abstract

Groundwater acts as the most important source of water supply throughout the world. Groundwater quality is mostly dependent on geology, soil types, climatic conditions, topography, underlain bedrocks, atmospheric precipitation and impact of anthropogenic pollution sources due to the activities that occur within the agricultural and industrial areas. The study area is "Girandurukotte" situated in the administrative district of Badulla, Sri Lanka. Groundwater samples were collected from 28 dug wells in once a month during a 15-month period. Around 82% of the wells of Girandurukotte are being used for drinking and domestic purposes. HACH digital titrator, AAS, ICPMS and HACH DR 2700 Spectrophotometer were used to determine the Cl⁻, Alkalinity, Ca²⁺, Na⁺, K⁺, Mg²⁺, SO₄²⁻ and HCO₃⁻ was derived using total Alkalinity. Piper diagram was constructed using Rockworks software. The results revealed that Na⁺ is the most dominant in the area except sample location 14 there was Ca²⁺ while Mg²⁺ shows the second-highest cation type and K⁺ is the least abounded while Ca²⁺ spreads thirdly in the area. 50% (14) of the sampling wells represent the Bicarbonate type in the study area while non-dominant anion type and chloride type water spread over in 7 sampling wells equally and its percentage is 25% and, there was no sulfate type water in the area. Results of the hydrochemistry suggest that all the water samples are alkaline. Major process controlling the water quality is the silicate weathering, mineral dissolution, Cation exchange and inverse cation exchange processes.

Keywords

Girandurukotte, groundwater quality, Graphical Tools,

Introduction

Groundwater acts as the most important source of water supply throughout the world (Prasanna et. al., 2011). Groundwater quality is mostly dependent on geology, soil types, climatic conditions, topography, underlain bedrocks, atmospheric precipitation and impact of anthropogenic pollution sources due to the activities that occur within the agricultural and industrial areas. Further, the quality of the groundwater could be affected due to subsurface geochemical reactions of weathering, ion exchange, precipitation, dissolution and various biological processes (Todd, 1980; Sakram et al., 2013).

The theory of hydrochemical facies can use and assess the chemical type of surface and groundwater. Further, this method provides enough information on the availability of the chemical composition of water (Kumar, 2013). Hill (1940) took the first attempt to

explain this and that was modified by Piper (1944), the Piper plot was further improved by Durow (1948). In a Piper diagram, which indicates major cations and anions in value of milliequivalents percentages in a separate triangulars. The plotted cations and anions in two separate triangulars are further projected in a central diamond which indicates the whole character of the existing water (Kumar, 2013).

Methodology: The study area “Girandurukotte” is situated in the administrative district of Badulla which is in Uva Province, Sri Lanka. The geographical position of Girandurukotte is between 80.975° longitude, 7.542° latitude and 81.048° longitude, 7.415° latitude. Groundwater samples were collected from 28 dug wells in once a month during a 15-month period from 2013 to 2015. Around 82% of the wells of Girandurukotte are being used for drinking and domestic purposes.

Chloride and Alkalinity were determined using HACH digital titrator. Sulfate was determined using HACH DR 2700 Spectrophotometer. HCO_3^- was derived using total Alkalinity. Atomic Absorption Spectrophotometer was used for the analysis of Ca^{+2} while, Inductively Coupled Plasma Mass Spectrophotometer was used for the analysis of Na^+ , K^+ , Mg^{2+} . Groundwater facies of the study area were determined using Piper trilinear diagram that was constructed using Rockworks software.

Results and Discussion

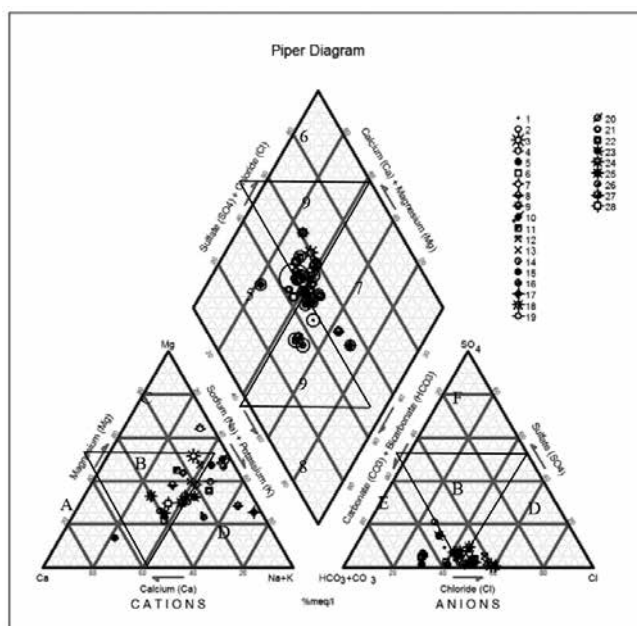


Fig. 1 Classification of groundwater facies in Piper diagram for study area

Understanding the quality of groundwater is the main determinant factor of its suitability for different users such as consumption, agriculture, industry etc. The study focuses mainly on the suitability of the well waters for drinking purposes based on geochemistry. Na^+ , K^+ , Ca^{2+} , Mg^{2+} , HCO_3^- , CO_3^{2-} , SO_4^{2-} and Cl^- are the major cations and anions in aquatic systems that are used for the categorization of the water type. Groundwaters in Sri Lanka are divided into four main water types namely; Calcium type, Magnesium type, Sodium/Potassium type and Non-dominant cation type (Dissanayake and Weerasooriya, 1985). Each type of above is further divided into subtypes; Cl^- , SO_4^{2-} , HCO_3^- , and NDA. Among the 28 locations, Na^+ and K^+ ranged between 5.88 to 55.81 mg/L and 0.30 to 2.33 mg/L representing the sampling locations of 21 and 14 respectively. Ca^{2+} and Mg^{2+} ranged between 0.72 to 59.35 mg/L at the locations of 2 and 14 and 3.6 to 23.48 mg/L at the locations of 6 and 14 respectively. Whereas, Cl^- ranged between 28.08 mg/L at 26 sampling locations to 79.62 mg/L at location 14 and HCO_3^- and Sulfate ranged between 70.40 to 278.10 and 1.40 to 87.73 mg/L at the locations of 3, 14, 18 and 14 respectively. The results revealed that Na^+ is the most dominant in the area except sample location 14 there was Ca^{2+} while Mg^{2+} shows the second-highest cation type and K^+ is the least abounded while Ca^{2+} spreads thirdly in the area.

By considering anion type of water, HCO_3^- is the most dominant in the area and the least spreading anion type was SO_4^{2-} except location 14 and Cl^- was in between HCO_3^- and SO_4^{2-} .

Hydrogeochemical Facies: The Piper trilinear diagram discussed in Piper (1944) was used to show the hydrogeochemical facies of the groundwater of the study area. The cations of Ca^{2+} , Mg^{2+} , Na^+ and K^+ , and the anions of HCO_3^- , SO_4^{2-} , and Cl^- were plotted in milliequivalent percentage concentrations as a multifaceted plot in two triangular fields which combine into the projected central diamond field. According to Back and Hanshaw (1965) from this diamond field, the inference is drawn based on the hydrogeochemical facies concept.

Twenty (71.43%) sampling wells represented a non-dominant cation type of water in the area. Ca^{2+} type water was present only in 3.57% of the well (only in sampling well 15) in Girandurukotte whereas 14.29% of the wells (4) represented Na^+ and K^+ type water, other three wells of 3, 4, 10 (10.71%) indicate Mg^{2+} type water. 50% (14) of the sampling wells represent the Bicarbonate type in the study area while non-dominant anion type and chloride type water spread over in 7 sampling wells equally and its percentage is 25% and, there was no sulfate type water in the area.

Based on the diamond-shaped diagram (Fig. 1), 50% of wells or 14 wells indicated Mixed type (No cation-anion exceed 50%) $\text{Ca}^{2+}\text{-Mg}^{2+}\text{-Cl}^-$ $\text{Ca}^{2+}\text{-Na}^+\text{-HCO}_3^-$ Ca^{2+} . In addition, the CaHCO_3 Water falls over 12 wells indicating 42.86% of the total. Two locations indicate (7.14%) NaCl water type in the area and there were no $\text{Ca}^{2+}\text{-Cl}^-$ or NaHCO_3 water in the area.

Conclusion

Results of the hydrochemistry suggest that all the water samples are alkaline. Major process controlling the water quality is the silicate weathering, mineral dissolution, Cation exchange and inverse cation exchange processes. Topographical undulations and the

groundwater flow were identified as the other supporting factors for the hydrochemical processes. Groundwater types were assessed and compared with Piper and Chadha's diagrams. 42% of the water samples were Ca-Mg-Cl types, in both methods. However, a slight variation was observed in the second-highest water type which was Na-Cl in the piper plot, which was shifted to Ca-Mg-CO₃ in Chadha's plot. Other types were similar in both methods.

References

- Back, W., and Hanshaw, B. B. (1965). Chemical geohydrology. *Advances in hydroscience*, 2, 49-109.
- Dissanayake C.B. and Weerasooriya S.V.R. (1985), *The Hydrogeochemical Atlas of Sri Lanka*, pp. 39-40.
- Durov SA (1948). Natural waters and graphic representation of their compositions. *Dokl Akad Nauk SSSR*, 1948; 59:87–90.
- Hill RA (1940). Geochemical patterns in the Coachella valley, California. *Trans Am Geophys Union* 1940; 21: 46–49
- Kumar, P. S. (2013). Interpretation of groundwater chemistry using piper and Chadha's diagrams: a comparative study from Perambalur Taluk. *Elixir Geosci*, 54, 12208-12211.
- Piper AM (1944). A graphic procedure in geochemical interpretation of water analyses. *Trans Am Geophys Union* 1944; 25: 914–923.
- Prasanna M.V., Chidambaram S., Senthil Kumar G., Ramanathan A.L. & Nainwal H. C. (2011) Hydrogeochemical assessment of groundwater in neyveli basin, Cuddalore district, South India, *Arab. J. Geosci.*, 4, 319–330.
- Sakram, G. Sundaraiah, R. Vishnu Bhoopathi and Praveen Raj Saxena (2013) The impact of agricultural activity on the chemical quality of groundwater, Karanjavagu watershed, Medak district, Andhra Pradesh *International Journal of Advanced Scientific and Technical Research Issue 3 volume 6*, Nov.-Dec. 2013
- Todd, D.K. (1980) *Groundwater hydrology*. Wiley, New York Todd, D.K. (2001) *Groundwater Hydrology*. John Wiley and Sons Publication, Canada, pp.280-281.

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Geochemical Classification of Groundwater of Auradhapura Area: Case Study Medawachchiya and Huruluwewa Area

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Abstract

The movement of groundwater from recharge to discharge is controlled by joint and fault systems of basement rocks. Therefore, different factors that affect to the quality of groundwater including natural and anthropogenic activities. Further, Groundwater is the principle source of drinking water supply in the rural sector of dry zone. Therefore, present study was forced on to study the geochemical classification of groundwater in Anuradhapura are with respect to CKDu prevalence Medawachchiya and CKDu less prevalence Huruluwewa area. All together 60 groundwater samples were collected in both areas. Stratified random sampling method was used to select the groundwater locations in the study areas. Eight water quality parameters were analyzed including K⁺, Na⁺, Mg²⁺, Ca²⁺, Cl⁻, SO₄²⁻, CO₃²⁻, and HCO₃⁻. All cations were analyzed by using Inductively Couple Plasma Mass Spectrometry (ThermoCapQICP-MS). Cl⁻, phenolphthalein alkalinity, total alkalinity were analyzed by using digital titrator: (model 16900, HACH) (Method 8207, 8203). Sulfate was analyzed by using HACH 2700DM Spectrophotometer (Method 8051). HCO₃⁻ content was calculated by the speciation equation given by the simple mass balance speciation method. The Ion balance was used as a quality assurance check of the groundwater. It helps to determine accuracy of water analysis. Water type classification is carried out by using piper diagram. It was constructed using ROCKWARE software. Most of the ion balance values indicated minus values and percentage difference 0% was not indicated in the ion balance analysis in both areas. However, Percentage difference $\pm 10\%$ is considered as acceptable limits of ion balance. Values higher than 12% has to be further explored and considered as influence with other ions. 93% and 97% of wells ion balance analysis data were indicated within the $\pm 0-10\%$ percentage difference in Medawachchiya and Huruluwewa respectively. According to the piper diagram, most of groundwater wells in the both study areas were consisting of alkaline earth (Ca-Mg type) but limited occurrence of the alkalies earth (chloride water) also exists in certain parts of the study areas. 93% for Medawachchiya study area and 63% for Huruluwewa study area represent the alkaline earth. No dominant type cation in both study areas and CO₃²⁻+HCO₃⁻ is the most common anion type in Medawachchiya and Huruluwewa study areas representing 93% and 80%, respectively. The area consists of mostly Ca and Mg containing metamorphic rocks. Therefore, not one cation type is dominate both areas. Dissolution of mineral phases such as pyroxene

and amphiboles that dominate the aquifer rocks may be the reason. The quality of groundwater in Medawachchiya and Huruluwewa areas are mainly affected by ion exchange, soil mineralization, carbonate dissolution. Present study confirmed that MgHCO_3 type is predominant (87%) in endemic CKDu area of Medawachchiya whereas MgHCO_3 type (47%) and Mixed type (40%) were common in non-endemic Huruluwewa areas.

Keywords

Water quality, ion balance, piper diagram, water types

Exclusive Summary

Introduction

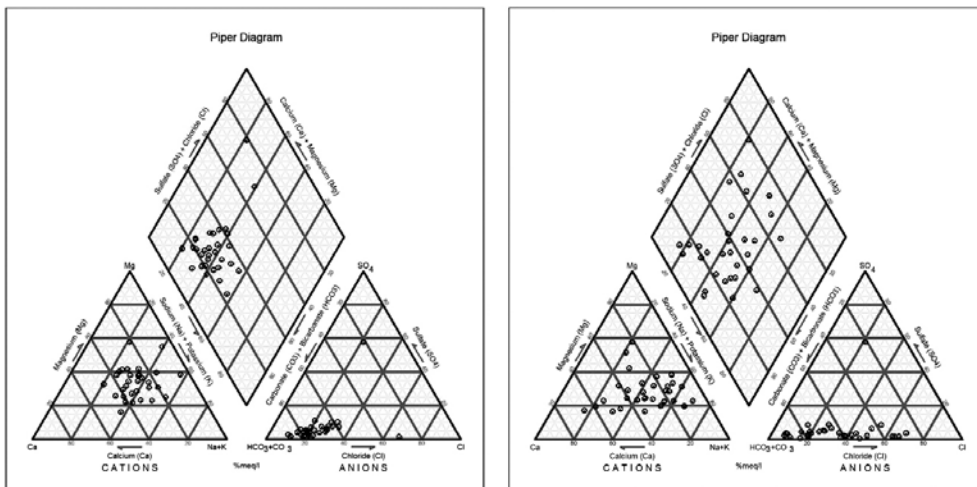
Hydrogeochemical processes such as ion exchange, dissolution, climate conditions, recharge and discharge etc. also determine the quality of groundwater (Raghunath et al., 2002). According to the Mouni (2010) groundwater flow in aquifer, aquifer minerals intermixing of water, chemical characteristics of recharge zone, interaction between rock water, climate condition topography and geological formation governs the quality of groundwater. Anthropogenic activities namely sewage and fertilizer leakage, over exploitation etc affected to the quality of groundwater. Groundwater of Sri Lanka mainly classified in to main four group: Calcium type, Magnesium type, Sodium/Potassium type and Non dominant cation type (Dissanayake and weerasooriya, 1985) The study areas consist of the shallow regolith aquifer of hard metamorphic rock region with small tank cascade (Panabokka and Perera, 2005; Panabokka, 2007). Also, Medawachchiya area was selected as high CKDu prevalence area and Huruluwewa area was selected as non- or less CKDu prevalence area. Present study was carried out to identify the geochemical classification of groundwater in Anuradhapura area with respect to the CKDu occurrence.

Methodology

Medawachchiya and Huruluwewa areas were selected as the study area and all together 60 groundwater samples were collected in both areas. Stratified random sampling method was used to select the groundwater locations in the study area. Both study areas were divided in to equal 30 quadrats and middle point of each quadrat was selected as groundwater location. That groundwater sources are used for the drinking water purpose in the area. Eight water quality parameters were analyzed including K^+ , Na^+ , Mg^{+2} , Ca^{+2} , Cl^- , SO_4^{2-} , CO_3^{2-} , and HCO_3^- . All cations were analyzed by using Inductively Couple Plasma Mass Spectrometry (ThermoFinnigan ICP-MS). Cl^- , phenolphthalein, total alkalinity were analyzed by using digital titrator: (model 16900, HACH) (Method 8207, 8203). Sulfate was analyzed by using HACH 2700DM Spectrophotometer (Method 8051) The HCO_3^- -content was calculated by the speciation equation given by the simple mass balance speciation method (USGS, 2013) (<http://or.water.usgs.gov/alk/methods.html>). The Ion balance was used as a quality assurance check of the groundwater. It helps to determine accuracy of water analysis. The calculations are based on the principles of electro-neutrality which means that the cation charge must equal to anion charge. The unit of the charge is milliequivalent (meq/L). Water type classification is carried out by using piper diagram. It was constructed using ROCKWARE software.

Results

Most of the ion balance values indicated minus values and percentage difference 0% was not indicated in the ion balance analysis in both areas. However, Percentage difference $\pm 10\%$ is considered as acceptable limits of ion balance. Values higher than 12% has to be further explored and considered as influence with other ions. 93% and 97% of wells ion balance analysis data were indicated within the $\pm 0-10\%$ percentage difference in Medawachchiya and Huruluwewa respectively. According to the piper diagram, most of groundwater wells in the both study areas were consisting of alkaline earth (Ca-Mg type) but limited occurrence of the alkalies earth (chloride water) also exists in certain parts of the study areas. 93% for Medawachchiya study area and 63% for Huruluwewa study area represent the alkaline earth. No dominant type cation in both study areas and $\text{CO}_3^{2-} + \text{HCO}_3^-$ is the most common anion type in Medawachchiya and Huruluwewa study areas representing 93% and 80%, respectively (Figure 4.1). The area consists of mostly Ca and Mg containing metamorphic rocks (Panabokka and Perera, 2005). Therefore, not one cation type is dominate both areas. Dissolution of mineral phases such as pyroxene and amphiboles that dominate the aquifer rocks may be the reason (Rubasinghe et al., 2015). Water in these areas are rich in HCO_3^- and Na^+ and/or Ca^{2+} . Chandrajith et al. (2011) noted that CaHCO_3 type is predominant in endemic CKDu area of Medawachchiya whereas Na-K non-dominant type water is common in non-endemic Huruluwewa areas. The quality of groundwater in Medawachchiya and Huruluwewa areas are mainly affected by ion exchange, soil mineralization, carbonate dissolution. Present study confirmed that MgHCO_3 type is predominant (87%) in endemic CKDu area of Medawachchiya whereas MgHCO_3 type (47%) and Mixed type (40%) were common in non-endemic Huruluwewa areas.



a. Madawachchiya

b. Huruluwewa

Fig. 4.32: Piper diagram for Madawachchiya and Huruluwewa based on average cations and anions

References

Chandrajith, R., Nanayakkara, S., Itai, K., Aturaliya, T.N.C., Dissanayake, C.B., Abeysekera, T., Harada, K., Watanabe, T. and Koizumi, A., 2011. Chronic kidney diseases of uncertain etiology (CKDue) in Sri Lanka: geographic distribution and environmental implications. *Environmental geochemistry and health*, 33(3), pp.267-278.

Dissanayake, C.B. and Weerasooriya, S.V.R., 1985. A geochemical classification of groundwater of Sri Lanka. *J Natl Sci Con Sri Lanka*, 13, pp.147-186.

Jayawardana, D.T., HMTGA, P. and Ishiga, H., 2010. Groundwater quality in different climatic zones of Sri Lanka: focus on the occurrence of fluoride. *International Journal of Environmental Science and Development*, 1(3), pp.244-250.

Mouni, L., 2010. Application of multivariate statistical methods and inverse geochemical modeling for characterization of groundwater—A case study: Ain Azel plain (Algeria).

Panabokke, C.R. and Perera, A.P.G.R.L., 2005. Groundwater resources of Sri Lanka. Water Resources Board, Colombo, Sri Lanka, 28.

Panabokke, C.R., 2007. Groundwater conditions in Sri Lanka. National Science Foundation of Sri Lanka.

Reghunath, R., Murthy, T.S. and Raghavan, B.R., 2002. The utility of multivariate statistical techniques in hydrogeochemical studies: an example from Karnataka, India. *Water research*, 36(10), pp.2437-2442.

Rubasinghe, R., Gunatilake, S.K. and Chandrajith, R., 2015. Geochemical characteristics of groundwater in different climatic zones of Sri Lanka. *Environmental earth sciences*, 74(4), pp.3067-3076.

First Record of Lamperts' Sea Cucumber (Synaptula Lamperti) in Northern Coast, Sri Lanka

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Abstract

Most sea cucumber species which are found all over the world are classified under high valuable species because of their commercial value. Apart from their commercial value those adorable creatures have great biological value. *Synaptula lamperti* also known as lamperts' sea cucumber comes under the Synaptidae family are still under awaiting to identification or less concern. However, in Sri Lanka there were few studies conducted to identify Holothurians. Therefore, this will be highly valued study to increase the biodiversity of Holothurians in Sri Lanka. Specimens were collected by snorkeling from muddy sea beds which are covered by sea grasses and sponges on the west coast of Northern Province of Sri Lanka, near the Valarmadi and Pallikuda fishing harbors at depth of 1-3m. Lengths of the individuals were measured using measuring tape. Collected samples were deposited in glass containers in live form and used to examine morphological features using hand lens. Identifications were accomplished with valid key of referred resources. They appear seasonally in Sri Lankan waters and seen draped around sponges, entangled around sea grasses and seaweeds as well. They basically live as groups that were included five (05) to twelve (12) individuals which covering the mature juvenile and adults. The total length of the body including the tentacle length were ranged from 80mm to 200mm and 6mm to 11mm in width. The elongated fragile body with rough sticky skin were stretched up to 180mm- 430mm. Semi translucent opaque white body wall with reddish purple longitudinal thin strips along anteroposterior axis and which made up by tiny dashes were identified. Cylindrical and watery body were covered by a thin fragile skin. Bubbles like bumps formations along four rows of the body as observed when they alter their position. External manifestation of tube feets were not seen but whole-body wall was covered by rows of tiny structures that are project through the skin which helps to attach to the substrates and for locomotion. Well-developed set of feathers like feeding tentacles with strips were observed. Rhythmic and constant movements of these short tentacles were supported to move food materials into their mouth cavity. Few surveys have been done throughout the Sri Lankan waters but have not been reported about this species until now. Thus this is the first report to describe the of *Synaptula.lamperti* which is found from the Sri Lankan waters.

Keywords

Sea cucumbers, *Synaptula* sp., First record, Northern coast

Executive Summery

1. Introduction

Most sea cucumber species which are found all over the world are classified under high valuable species because of their commercial value. There was no record in Sri Lanka related to consumption of sea cucumbers and the whole production is currently exported (Dissanayake and Athukoral, 2009). *Synaptula lamperti* (Heding, 1928) also known as Lamperts' sea cucumber comes under the Synaptidae family are still under awaiting to identification or less concern (<http://www.marinespecies.org/aphia.php?p=taxdetails&id=242070>). This species lives in the benthic areas up to the 0-35m (Lane et al., 2001). Lamperts' sea cucumbers distribute along the Indo-West Pacific region. However, in Sri Lanka there were few studies were conducted to identify Holothurians. Therefore, this will be highly valued study to increase the biodiversity of Holothurians in Sri Lanka.

2. Methodology

Specimens were collected by snorkeling from muddy sea beds which are covered by sea grasses and sponges on the west coast of Northern Province of Sri Lanka, near the Valarmadi and Pallikuda fishing harbors at depth of 1-3m. This study was conducted from February 2020 to June 2020. Lengths were measured using measuring tape. Water quality parameters were checked in those areas and same water filled with a clean glass tanks and were provided with same situations to study the morphological and behavioral features of the newly found sea cucumber species. Collected samples were deposited in glass containers in live form and used to exam under hand lens at 10× magnification. Visual observation method was used to identify the morphological features. Identifications were accomplished with valid keys of the referred resources.

3. Results and Discussion

The morphological features were used to identify the sea cucumber species. According to the information gathered from local communities and observations in selected study period, this species was appeared seasonally in Sri Lankan waters and seen draped around sponges, entangled around sea grasses and seaweeds as well.

They basically live as groups that were included five (5) to twelve (12) individuals which covering the mature juvenile and adults. All individuals were found in depth between 1 to 3m benthic regions in the study area. However, this species was not found in observed dead corals cover areas. They have semi translucent opaque white body wall with reddish purple longitudinal thin strips along anteroposterior (AP) axis which made up by tiny dashes (Figure 3.1). Cylindrical and watery body was covered by a thin fragile skin (Figure 3.2). Bubbles like bumps formations along four rows of the body as observed when they alter their position. External manifestation of tube feets were not seen but whole-body wall was covered by rows of tiny structures that are project through the skin which helps to attach to the substrates and for locomotion.

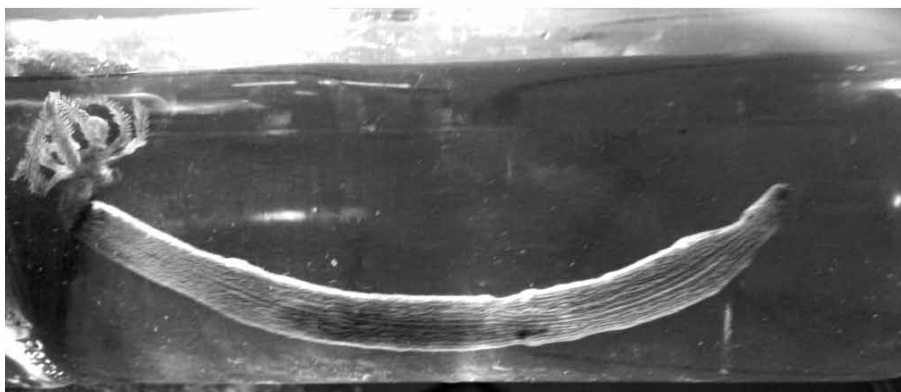


Figure 3.1 Semi translucent opaque white body



Figure 3.2: Elongate cylindrical body



Figure 3.3: Pinnate Feeding tentacles

The total length of the body including the tentacle length were ranged from 80mm to 200mm and 6mm to 11mm in width. They can stretch the body up to 180mm– 430mm in length Well developed set of feather like feeding tentacles with strips were observed (Figure 3.3). Rhythmic and constant moves of these short tentacles were helped to move food materials into their mouth cavity. Elongated fragile body with rough sticky skin. They show nocturnal behavior, it means that they feed at night. They suddenly active and in nighttime they propelling themselves with series of waves and subsequent contractions with performing bubble-like formation series along four rows of their AP axis. These movements are facilitated by the adhesions derives from their rough skin and hydrostatic pressure created by their body.

Clark and Rome (1971) revealed that there were four species belongs to synaptula genes existing their study areas near to Ceylon. Fernando (2006) and Kumara et al (2005) cited the Clark and Rome (1971) list of synaptua species. However, there was no any

evidence that the *synaptula* sp. were recorded in Sri Lanka in last three decades. Few surveys have been done throughout the Northern Provincial waters but have not been reported about this species until now. Thus this is the first report to describe *S.lamperti* which is found from the Sri Lankan waters. Further, identification process is being carried out using the spicules.

Kingdom - Animalia
Phylum - Echinodermata
Class - Holothuroidea
Order - Apodida
Family - Synaptidae
Genus - *Synaptula*
Species-*Synaptula lamperti* - Heding 1928

Conclusion

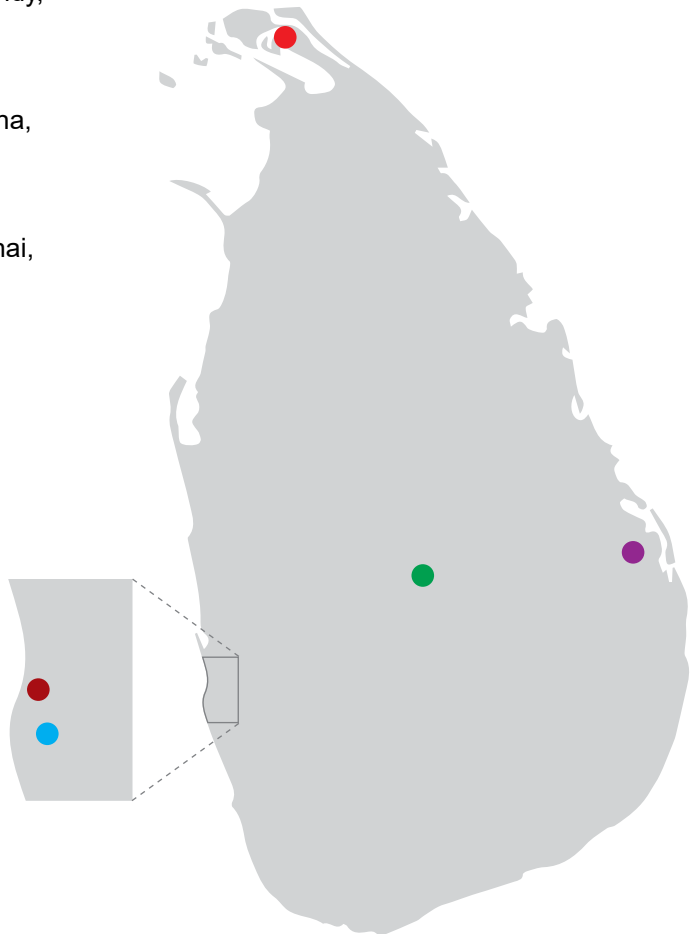
The collected specimens are identified as *Synaptula lamperti* which is the first record in Sri Lanka.

References

- Clark, A.M. & Rowe, F.W.E. 1971. Monograph of shallow-water Indo-West Pacific echinoderms: i-vii, 1-238, pls 1-31. London, Trustees of the British Museum
- Conand C. 1998. Holothurians. p. 1157–1190. In: Carpenter K. and Niem V. (eds). FAO species identification guide. The marine living resources of the Western Central Pacific. Vol. 2 cephalopods, crustaceans, holothurians and sharks. FAO. Rome
- Dissanayake, D.C.T. and Athukorala, S., 2009. Status and management of sea cucumber fishery in Sri Lanka. Final project report (FAO, CIDA and IFAD).
- Fernando, M., 2006. Coral associated invertebrates: An overview of the current taxonomic status. The Fauna of Sri Lanka, IUCN-World Conservation Union, pp.259-273.
- Kumara, P.B.T.P., Cumarathunga, P.R.T. and Linden, O., 2005. Present status of the sea cucumber fishery in southern Sri Lanka: A resource depleted industry. SPC Beche-de-mer information bulletin, 22, pp.24-29.
- Lane, D.J., Marsh, L.M., VandenSpiegel, D. and Rowe, F.W., 2001. Echinoderm fauna of the South China Sea: an inventory and analysis of distribution patterns. Raffles Bulletin of Zoology, 48, pp.459-494.
- Massin, C., 1999. Reef-dwelling Holothuroidea (Echinodermata) of the Spermonde archipelago (south-west Sulawesi, Indonesia). Nationaal Natuurhistorisch Museum.
- World Register of Marine Species. (2011) *Synaptula lamperti* Heding, 1928. Retrieved July 27, 2011 (<http://www.marinespecies.org/aphia.php?p=taxdetails&id=242070>)
- Atlas of Living Australia *Synaptula lamperti* Heding, 1928 (<https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:dc725ce0-d808-4f1b-b104-0ae9b4d6c821#overview>)

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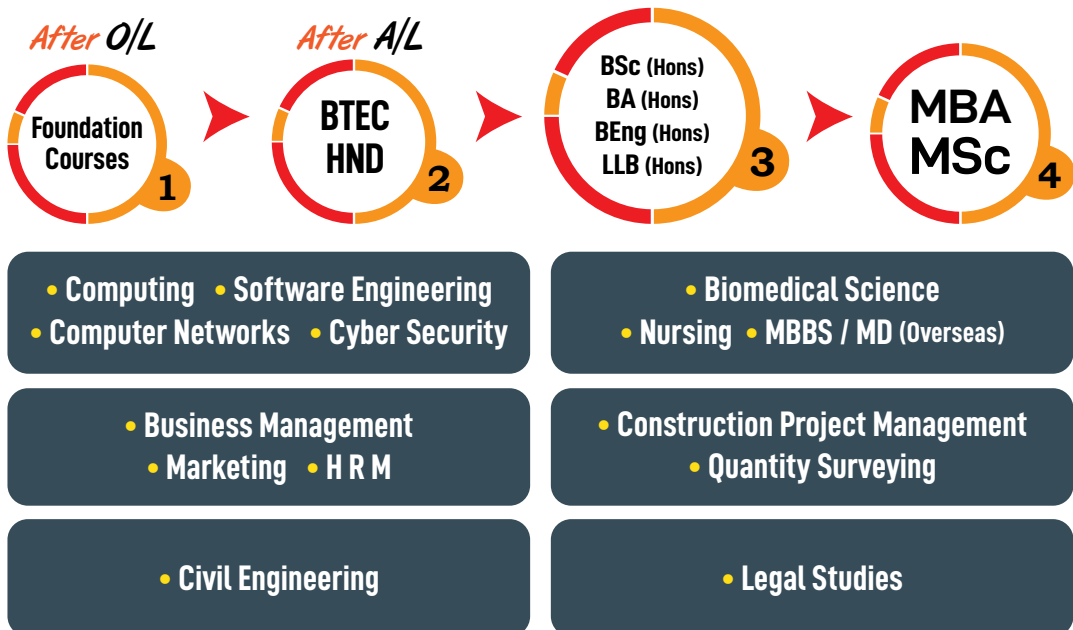
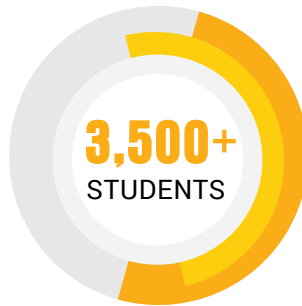
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