BCAS International Research Symposium 2018

"Leadership and Accountability
for Sustainable Development of a Nation"

BCAS CAMPUS
BRITISH COLLEGE OF
APPLIED STUDIES

Building Careers – Transforming Lives

Vision | ## Mission

Vision	Mission
To become the premier private university in the region	Produce quality human resources with ethics and social responsibility, having innovative thinking and analytical skills to serve humanity

BCAS International Research Symposium 2018

19th November 2018 (Monday)
9.00 am
@ BCAS Mount Campus
(54, Galle Road, Mt. Lavinia)

Subject – Disclaimer

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20 years of

years of

TRUST & EXCELLENCE
IN HIGHER EDUCATION

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BCAS CAMPUS

Established in 1999, British College of Applied Studies (now popularly known as BCAS Campus) has rapidly grown into a leading educational provider in Sri Lanka with a large number of students more than 4,000. BCAS Campus has strong international collaboration, especially with the University of Wolverhampton (UK), London South Bank 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 five key cities in Sri Lanka, namely, Kandy, Jaffna, Kurunegala, Batticaloa and Kalmunai with a highly successful overseas centre in the State of Qatar. Plans are under way to open more overseas centres.

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 4,000 students follow their chosen courses of study at BCAS Campus - Quantity Surveying, IT, Law, Business Management, Telecom Engineering, Civil Engineering and Biomedical Science. These courses are delivered at HND Pearson (Edexcel) UK as well as at degree levels. MSc in Construction Project Management, MBA and LLM (Professional Practice) are the three Master's programme delivered by us.

International Collaborations

Our relationship with the University of Wolverhampton, UK was established in 2006 with an agreement to transfer students completing BTEC HND in QS to do their BSc (Hons) in QS in the UK. Thus the first batch of 30 students were transferred to the university in 2006. This trend continued steadily and more than 450 students earned their degrees directly from the University between 2006 and 2012. With the introduction of in-country delivery of degrees at BCAS Campus in Colombo in 2011 and formalization of the first agreement to that effect, the number of students opting to complete their Top-up Degrees right here in Sri Lanka gradually increased. Thus making it the most popular option among Sri Lankan Students.

Thereafter, successively, several MOUs were signed to deliver the university's selected degree programmes in Colombo at BCAS Campus itself – BSc (Hons) QS, LLB (2011), BABM, MBA (2012), MSc - CPM (2014), LLM Professional Practice (2015), BSc (Hons) Biomedical Sciences (2015).

The other university we work with is London South Bank University, UK and we deliver their BSc (Hons) degree in Commercial Management (QS) and BSc (Hons) Civil Engineering while our relationship with the Edexcel, UK (now known as Pearson, UK) dates back to 2002.

Building Careers - Transforming Lives

BCAS in Brief

Year	Events
1999	• Founded as IT/English training institute in Kandy
2000	• BCAS Placement division, placed 12 students-UK Uni's
2001	• Established 1st BCAS Centre in Colombo
2002	• Setup the 'Corporate Office' in Colombo • Launched BTEC HND in IT/Computing
2004	• Vocational Courses in Construction, placed students in Industry. • MoU with Many UK Colleges and Universities • Expanded Kandy Campus /launched HND Computing /IT
2005	• Launched BTEC HND in QS • Launched Vocational Programme – 'CAD and Building Studies'
2006	• Articulation agreement with the UoW for students' progression • Launched Vocational Programme – 'Teacher Training'
2007	• 1st batch of students transferred to UoW • Established HND QS Centre in Dehiwala Campus
2008	• Set up BCAS Qatar Campus / Launches HND in QS • BTEC HND in Business Management
2009	• BTEC HND in Electrical / Electronic (Telecom) • BTEC HND in Law
2010	• QS Top-Up Degrees in Qatar Campus - Bsc (Hons) QS- UoW • QS Top-Up Degrees in Dehiwala Campus - Bsc (Hons) QS- UoW
2011	• BTEC HND in – Biomedical Science - UoW • Established Batti Campus • EDEXCEL UK Award - Fastest/Most Outstating BTEC HND Centre • ISO 9001 – 2008 Certified
2012	• BM Top-Up Degrees in City Campus - BA(BM) - UoW • LLB Top-Up Degrees in City Campus - LLB- UoW • Established Wayamba Campus • MBA – Launched in City Campus- UoW
2013	• BTEC Level-7 Strategic Management – MBA Pathway- UoW • BTEC HND – Civil Engineering • Recognized by LMD Magazine as the "No.1 Private Education Provider
2014 2015	• MSc Construction Project Management- UoW • MSc Strategic IT Management- UoW • MSc IT Management- UoW • BSc (Hons) Management of IT / BSc (Hons) Computing - UoW

BCAS Organization Chart

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BOARD OF          CHAIRMAN          BOARD OF
DIRECTORS                           GOVERNANCE
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Admin & Human Resources	Finance	Business Development	Operations	Branch Network	Academic
Manager Human Resources	**Director** Finance	**General Manager** Business Development	**General Manager** Operations	**Managers** & Directors	**Dean** Academic Affairs
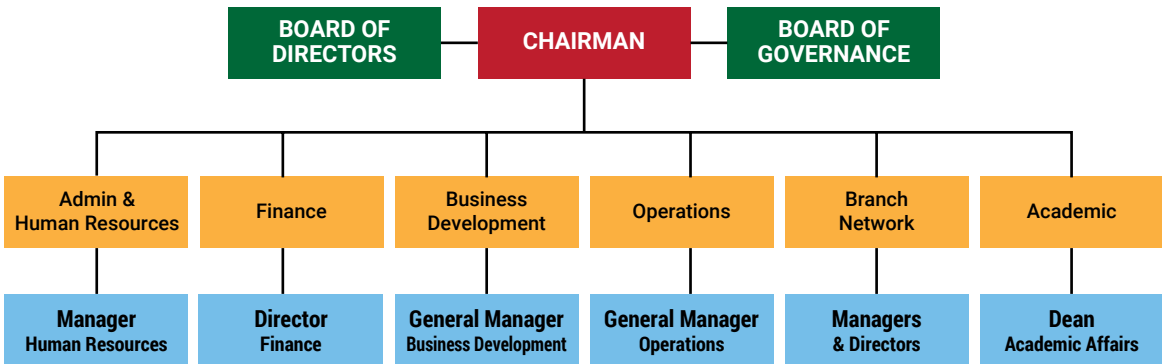
Board of Governance

Chairman, CEO - Eng Abdul Rahman

Director - Eng M Mafeel

Director - Mr J Niwas

Dean Academic Affairs - Prof K Hirimburegama

General Manager Operations - Eng Kawther Musthafa

General Manager Business Development - Mr M Isthiquar

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Mr S Asiriwatham, FCA SL, Former President Partner & Country Head - KPMG

Prof. Rohan Rajapakshe, Former Director - Ministry of Higher Education

Dr Mahroof, Head, Civil Engineering - University of Peradeniya

Dr K. Kobindraraja - Former Vice Chancellor - Eastern University, Sri Lanka

Dr Yasa Siriwardana - Director - Medi Calls

Prof M D Lamawanse - Professor of Surgery - University of Peradeniya

Prof K K Y W Perera - Former Secretary - Ministry of Power & Energy,
                    - Former Vice Chancellor - University of Moratuwa

Divisions / Academic Schools

- BCAS School of Legal Studies
- BCAS School of Management
- BCAS School of Building Studies
- UG / PD Division
- BCAS Placement Division
- BCAS School of Computing
- BCAS School of Engineering
- BCAS School of Health Science
- BCAS English Language Teaching Unit
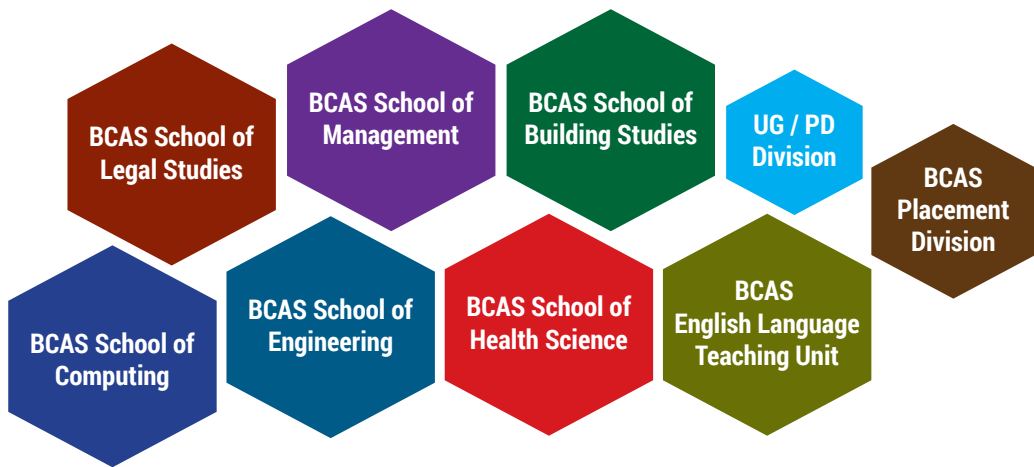
Quality Management Structure

- Board of Management
- Academic Syndicate
- Board of Examination

Service Divisions

- Student Placement and Study Abroad Division (Located in BCAS)
- PAC Asia
- Student Counselling Division (Located in BCAS)

Qualification Frameworks

Diagram elements:

- 5 | MSc PGD (SLQF Level 7 & 8)
- 4 | BSc (Hons) (SLQF Level 5 & 6)
- 3 | BTEC HND (SLQF Level 4)
- 2 | Foundation Course (SLQF 3/NVQ 3)
- 1 | After O/L
- After A/L

Sri Lanka Qualification Framework (SLQF):

- 1 Certificate
- 2 Advanced Certificate
- 3 Diploma
- 4 Higher Diploma
- 5 Bachelors
- 6 Bachelors Hons.
- 7 PG Cert. PG Dip.
- 8 MA, MSc
- 9 MPhil, DM
- 10 PhD, MD

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			
Honours Bachelor	SLQL-6		QCF-L6	Bachelor's degrees, eg BA, BSc
Bachelor Degree	SLQL-5	NVQ-7		
High Diploma	SLQL-4	NVQ-6	QCF-L5	BTEC HNDs (Higher National Diplomas)
Diploma	SLQL-3	NVQ-5	QCF-L4	BTEC HNCs (Higher National Certificates)
Advanced Certificate	SLQL-2	NVQ-4	QCF-L3	BTEC National Diploma
Certificate	SLQL-1	NVQ-2, 3		BTEC National Extended Diploma

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SYSTEMS
8327

QAA
Quality Assurance Agency UK

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WOLVERHAMPTON
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UEL
University of
East London

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TERTIARY AND
VOCATIONAL EDUCATION
COMMISSION
SRI LANKA

virtusa | POLARIS

SPRIT NETWORK
NETWORK SOLUTION

Supreme Education Council

Maldives Qualifications Authority
www.mqa.gov.mv

Ranking

"Platinum Partner"
No.1

BTEC Centre in Sri Lanka

by Pearson - UK
2017

Asia's Training
Excellence Award
2017

Best Employer
Brand Award
2017

International & Local Awards

Platinum Partner
No.1 BTEC Centre
in Sri Lanka

2016

Educational Institute
with Best Academic
& Industry Interface

2016

Visionary Leadership
Award for
BCAS Chairman

2016

Academic
Impact Winner

2016

Ranked as No.1
Higher Education
Provider

2014

BTEC
Gold Partner

2013

Performance
Excellence Award

2011

Fastest Growing
BTEC Centre

2010

Remarkable memories of

BCAS

Annual Research Symposium 2017

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School of
Building Studies

Women Employee in Construction Industry; Challenges and Issues as a Quantity Surveyor in Sri Lanka

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Abstract

Compare with other industries, women involvement is lack in the field of construction, today in Sri Lanka. It's noted that women have a considerable role to play in construction industry and that she can build successful careers within the industry further. However work in construction industry is not an easy task in the nature of macho environment. There are lot of challenges exist towards women employment in the field. In this context, the research intends to examine the reasons for the lack of women working in a professional capacity within the construction sector. The sample was limited to 40 women workers in both, sites operations and consultancy office wherever in Sri Lanka. The final outcome identified several barriers that discourage women from the attracting, involving and retaining in construction field. Having considered the nature there are number of recommendations have been made to increase women involvement in the sector while promoting or protecting female workers align with future demands of the country.

Keywords

Role of women, Construction field, Challenges

Introduction

Construction industry is one of the most important industries which contribute a lot for the economic growth and employment. It creates market for other industries to assist the development of other trades. According to trading economics, the contribution to Sri Lanka's GDP from the country's construction industry is remarkable, which is increase year over year, 6.6% contribution in 2009 to 8.7% in 2013 and an impressive 9.6% in 2014 and finally in the second quarter of 2017 the growth reported 9.3% when compared to last year. On the other hand labor demand reported for construction sector was 20,224 and in the construction sector a number of 20,193 positions are to be hired and the highest demand has been reported for building construction workers are 4358.In this way it is clear that the construction industry of Sri Lanka is booming further. (DCS, 2017)

The construction industry is not a single frame but a combination of many associates with multi disciplines. (Harvey and Ashworth, 1993) It is a project oriented work with large workforce of professionals and workers at the different levels. Not like other industries, organizational culture of construction industry shows a macho culture where relationships are characterized by argument, conflict and crisis (Gale, 1994b) therefore both employees male and female are exposed to a highly adverse workplace environment. Hence it observed that female staff turnover rate is high than man in construction field (Davidson & Cooper ,1992) and also young women tend to become disappointed with their career and seek to leave or change the field early on their careers. Compare with other industries, women involvement is lack in construction sector today in Sri Lanka.

Hence this research intends to examine the reason for women working in a professional capacity within the construction field.

Research Body

It has been noticed that numerous female students have passed out from universities, technical colleges, and private institutes since many years, withholding the qualification of building studies. According to labor assessment survey (DCS, 2017) undergraduate admissions by academic stream and sex (2012) reported in Architecture/Quantity Surveying was 49.40% males and 50.60% females. As per construction industry training board (2003) most of women constitute 8% of construction students from the universities.

Dainty et al (2000) found that recruitment practices of women for new positions of the industry especially contracting office are informal. However these can be discriminatory section criteria and sexist attitudes (Fielden et al, 2000). With these practices leads the industry make unattractive and male dominated culture with bias. Similarly, work family conflict is defined by Wentling (1996) as ongoing problem for women with career aspirations. Though in such, there is a concern that to attract and retain females within the carrier in construction industry. The main objective of this paper is to identify the background to the problem. Secondly to find out what factors influenced their professional career as a quantity surveyor in construction sector. Similarly, to discover, most challenging issues which effect to women's career, in the context of Sri Lankan construction industry. Finally it expects to find solutions and recommendation for these challenges and issues.

Basically, the research sample was limited to forty women workers who involved with construction field both site operations and consultancy work wherever in Sri Lanka. The age group varies over 25 to 48 years old women. The study was conducted through semi structured random selective interview method with self-administered questionnaire. Further it was carried out a comprehensive review of previous researches followed by qualitative analysis. Meanwhile quantitative analysis method has been used with the support of MS excel 2010 software analysis to penalize further.

Conclusion and Further Research

The final outcome identifies number of barriers that discourage women from the attracting and retaining in depends on the nature of the organization, the level of the female workers, culture of physical workplace environment and personal relationships, salaries and wages, risk in security. In general context women still bear the primary responsibility for dwell duties than men and she need to balance both family and profession in good manner. The most challenging factors are long working hours with night shifts, weekend work, requirement to travel, stressful work etc. These factors directly affect to women with family commitments especially in Sri Lanka. Also, females are losing opportunity of developing their career and skills in their profession due to no or less opportunity given by private sector for women either directing further studies or training. Finally, the research made number of recommendations to promote or protect women engagement; flexible organizational culture - provide family-based accommodation, flexible working hours or shift basis, promote recognition, affordable salary, alter the image of the profession etc. These recommendations help to encourage female workers towards built environment and to absorb opportunities with possible solutions for skill shortage in the

field of construction industry.

It's true that most of female workers engaged in administrative positions in consultancy office compared to professional technical positions in site. Hence the future research should focus on the variety of settings; women work tendency with cultural norms and leadership aspects.

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Consequences of time over run in Residential type of construction Projects in Colombo District over the Period of 2017 – 2018

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Abstract

Time overrun also known as delay is often in the construction industry of Sri Lanka. Sri Lanka is one of the country which is having the high exposure for the infrastructure development. The main concept of the research paper is to identify the main causes of delay in the residential type of construction in the Colombo. A structured questionnaire has been sent to 30 stake holders of construction such as clients, contractors, consultants & sub contractors. With the 26 responses the relative importance index has been analyzed for different clauses. The results from the relative importance index listed the most significant clauses in the Colombo district over the duration of the 2017-2018. The study emphasized the documentation in the construction, detailed BOQ, mechanism for the contract documents & the planning scheduling.

Author Keywords

Residential apartments, Delay, Time overrun, Relative Importance Index

Introduction

The construction project can be categorized in to a number of categories based on the design, scope, and procurement methods of the project. The construction industry in Sri Lanka is vital sector which is contributing to the national GDP in considerable level. Sri Lanka faced the longest imbalance situation in the development because of the ethnic conflict in the country. After the year 2009, when Sri Lanka concluded the conflict in the country, the development phase of the country went to the peak.

During the period of time Sri Lanka had the huge infrastructure development which indicated the growth of the construction industry & the growth has been measured as 16.1% which is the highest in the history. Over the duration of the capital of Sri Lanka Colombo has been awarded as the fastest growing city in the world. Different set of construction enriched the outlook of Colombo, which is the high populated district in the country & the construction of the residential apartments are one of the high demanded development in the country. The purpose of this research study was to identify the causes of construction delay in residential apartment projects in Colombo over the period of 2017 – 2018.

Mr.Chan and Mr.Kumaraswammy have done a research, which is related to residential construction projects based on Hong Kong. The research was a survey kind of research, which assessed the relative importance of 20 potential delay factors in the residential type of construction Hong Kong context. Through the research projects, Mr.Chan & Mr.Kumaraswammy have identified five key factors such as poor risk management &

supervision, unforeseen site conditions, slow decision-making, client-initiated variations, and work variations.

A well designed questionnaire which includes 26 causes questionnaire that to be conducted about the ground water projects was done during the time period of 1970 to 1999 in Ghana. The questionnaire was provided to the three type of main parties (Client, contractor, consultant) of a ground water projects in government sector and the private sector. 55 clients, 30 consultants and 4o contractors have answered the questionnaire. The study has given the arguments mainly based on monthly payment difficulties from agencies, poor contractor management, material procurement, poor technical performance, and escalation of material prices.

The Research methodology includes a questionnaire preparation to find out the main cause for the delay in residential construction. This questionnaire has been prepared based on the relative Importance index technique.

$$R.I.I = \frac{\Sigma w}{A \times N}$$

Is the equation to find out the rankings of each clauses of all 15 clauses? All 15 clauses will be Applied in the equation and it's provide the ranking of most significant clause. The questionnaire given to 30 people who are working on the residential type of construction projects but only 23 people have responded to the questionnaire

The R.I.I used to rank the clauses it gives the possibilities to compare the importance of the clauses. Each causes will provide R.I.I answer which have occurred by the rankings of all professionals. This will uses the general and overall rankings in order to give a clear picture about the causes of delay in residential construction in Colombo. The results of the "Relative importance index" have been calculated for the causes and listed.

No.	cause	R.I.I	Rank
1.	Variations by client	0.946	1st
2.	Errors in construction	0.902	2nd
3.	Poor Documents maintenance	0.880	3rd
4.	Slow progress in decision making	0.869	4th
5.	Poor site management & Supervision	0.859	5th
6.	Delay in material delivery	0.837	6th
7.	Errors in Design	0.826	7th
8.	Delay for the permissions from the local authorities	0.760	8th
9.	Poor labor skill	0.753	9th
10.	Change in materials & specifications	0.707	10th
11.	Weather conditions	0.685	11th
12.	Neighbors & surroundings	0.663	12th
13.	National economy & political involvements	0.587	13th

According to the ranking of the causes for the delay, the most significant causes have been identified as the variations by client, errors in construction, and slowness in decision-making by the clients, and the poor site management and supervision, Distribution of contract documents on time. Those five causes have the low level of difference in relative importance index in between them. The case studies have been selected based on the delayed projects which were suffering to finish within the exact time because of the identified significant causes.

Following recommendations suggested for the purpose of covering the client oriented & contractor oriented causes of the delay.

- Must have a proper documentation & entries in the site in order to record the variations by the clients.
- Prepare a BOQ at the starting of the construction project & maintain the cost until the completion of the project.
- Must have a proper contract documents between the contractor & client, specially when it working with the variation.
- The contractor site professionals must have the awareness about the project planning & scheduling.

In the year of 2018 the residential apartments construction taking a huge part in socio – economic improvement. The slum evacuation projects, middle income studio type apartments, semi luxury apartments, national housing development projects, & ultra-luxury type of residential type constructions satisfy different income people in the country. Other than Colombo districts like Kalutara, Gampaha, Galle, Kandy, Trinco, & Jaffna are adopting the residential type of constructions.

The construction industry is entitled to take the responsibility for the time overrun in the residential types of construction. This research study is important for the residential type of the construction where this type of constructions in Colombo, doesn't maintain a proper documentation & strategy to complete the projects successfully. The adoption of the given suggestions will help to finish the residential apartments project within the estimated budget, duration & with the expected quality.

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Manthankumar K. Vaghani, Mr. Vyom B. Pathak, Mr. Keyur P.Shah   A SEQUENTIAL ANALYSIS OF FACTOR FORCING TO PROJECT DELAYS USING R.I.I. TECHNIQUE

Long Le-Hoai, Young Dai Lee & Jun Yong Lee, "Delay and Cost Overruns in Vietnam Large Construction Projects: A Comparison with Other Selected Countries", KSCE Journal of Civil Engineering (2008) 12(6):367-377 DOI 10.1007/s12205-008-0367-7 (Page No. 367 – 377), 2008.

Recycled Concrete:
Investigating the strength of recycled aggregates

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Abstract

As a developing nation, Sri Lanka has come to a financial standstill in terms of growth. For any nation to prosper, recycling materials plays a huge role. Construction industry plays a major role in the above mentioned growth and with the financial barriers accumulating; recycling building materials is the need of the hour. Being a nation depending highly on conventional concrete structures due to lack of skilled professionals in the green building industry, recycling these buildings after it's allocated time period is the only way to reduce cost and also to control the resources available. Demolished concrete are mainly used as landfills or dumped at sites due to the lack of research done about it. In this investigation the strength of demolished concrete used as aggregates were the main materials tested. Existing concrete were demolished and re-casted after it was taken through a well graded sample to check its strength and to check whether it can retain a higher grade. It was observed that these demolished concrete doesn't affect the fresh concrete even though it was taken from different sample grades of recycled aggregates; which brings to a conclusion that concrete can be recycled regardless of its strength and a further study is feasible on the particular material since it can retain the strength absolutely. In conclusion to the experiment, it is possible to form a standard criteria and values on how to select materials and quantities accordingly. This will help the engineers in following a standard procedures rather than going through a trial and error method and eradicate the waste from demolished buildings.

Keywords
Demolished concrete, well graded, recycled aggregates

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School of
Management

The Conceptual Study Sexual Harassment at Workplace in Sri Lanka.

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Abstract

Sri Lanka is the country consists of multicultural people among workplace. In the past record According to the Global Gender Gap(GGG) Index 2016, Sri Lanka ranks 100th in terms of gender parity and discrimination, out of the 144 countries surveyed. Sri Lanka being a developingcountry, along with men, women are also working in several of organizations. Compare to western countries Sri Lanka people less awareness about handing harassment in workplace and they mostly failed to inform harassment due to cultural disparity and lack of knowledge handling harassment practices   Therefore, it becomes necessary men or women where they are working must be safe at their workplace which gives healthy relationship and mutual understanding among employees & optimum or maximum productivity to the organization. Due to the unawareness of sexual harassment, its policy/rules and regulation and new Act many employees directly or indirectly suffering from sexual harassment, these victims are very silent either not having knowledge of Act/ legal procedure or due to non-implementation of sexual harassment policy. At the end the researcher has tried few suggestions for preventing sexual harassment & implement the policy of sexual harassment in their organization successfully. The main objectives of this paper to determine the responsibility of HRM regarding Sexual Harassment at workplace, to acquaint with various forms of sexual harassment to guide the organization for implementation of sexual harassment policy and to provide remedies for sexual harassment at workplace. The main purpose of this paper researcher tries to give awareness about situation where HRM can identify the sexual harassment and explained how the HRM can identify when any employee in their workplace or organization has harassed in addition with that the knowledge of harassment also increased end of this paper. This paper prepared based on the secondary data and here author used literature review as a tool of methodology and this paper fully prepared based on content analyse.

Keyword

Cultural Disparity, Discrimination, HRM, Sexual Harassment, Violence, Workplace

Introduction

The suggestion including that when an employee complains to a supervisor, another employee, or the Human Resources office, about sexual harassment, an immediate investigation of the charge should occur. Supervisors should immediately involve Human Resources employee. Employees need to understand that they have an obligation to report or convey sexual harassment concerns to their supervisor or the Human Resources office.

• Organization should maintain specify harassment policy.
• Organization should make own zero tolerance sexual harassment policy.
• A policy has to be effectively implemented in order to have value and to avoid becoming

another well-formulated, impressive sounding document compiled by consultants and filed by the human resource department
- Organization Unions should be involved in every step of the implementation or progressive process.
- The policy programmes shall include orientation, education, training and diversity awareness programmes.

The conclusion included inan organizations employee are treated as human resource. Labours are very important factor of production like other factors of production. Employees are treated as wealth of an organization. Therefore, there should be healthy atmosphere among employees in an organization. As the law of Sri Lanka has given right to a safe environment free from sexual harassment it is a duty of HRM to find sexual harassment if is occurring in an organization. HRM should take precaution before occurring sexual harassment, if occurs it should take immediate action to solve the problem. Further research can have done in defining the duties of various authorities in sexual harassment at schools, colleges, film industry, housing societies etc.

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Online Hr Blog

Investigating the Factors Affecting Digitization of Retail Banking Services on Customer Satisfaction in Colombo, Sri Lanka

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Abstract

This research is conducted to find out the factors that affects retail digital banking services in Colombo Sri Lanka. Three main digital banking services such as online banking, mobile banking and automated teller machines were deliberated.

According to Bareisis and Latimore (2014) Digital banking is changing the activities of manual banking such as deposits, withdrawals, transfers, checking balances, requesting for other banking desires such as credit cards, debit cards, cheque books, cashiers orders, secret code numbers and bank statements by synchronizing the front end, middle office and back end activities of a bank and bring it all together to a virtual platform and make it available for the customer to use. Digitization is a combination of Internet banking, SMS banking, Automated Teller Machines or Mobile banking facilities that it provided by banks.

Fernando and Kumar (2017) stated that without any exceptions to Sri Lanka being a developing country, Sri Lankans also seek for efficiency and speed to have convenient banking service in today's world. It is stated that in the year of 2016, the acceptance for online and mobile banking of Sri Lankans increased by 75% which indicates that as customers are satisfied due to digitization, this preference has occurred.

Five commercial banks in Sri Lanka were considered namely, People's Bank, Commercial Bank, Nations Trust Bank (NTB), Sampath Bank and Hatton National Bank (HNB). Also the information on development highlights of digitization of ATM, Internet and mobile banking services are shown in the table below. Primary data was collected using a survey where 100 validated samples were selected.

The research evidenced Reliability, Security, Availability, Convenience and Responsiveness as significant factors affecting customer satisfaction.

Author Keywords

Digitization, Digital banking, retail banking, customers, Customer satisfaction, affecting, reliability, security, cost, assurance, availability, convenience, service quality and responsiveness, positive, negative, factors.

Introduction

According to George, Pandian and Mukhopadhyay (2017) "Digitization is a change to a new technology together with the change in customer preference by providing the necessary resolution with the use of digital techniques".

Retail Banking services are the banking activities conducted by personal individuals which generally includes ATM deposits and withdrawals, transfers between own and third party accounts, fixed deposit facilities, mortgage facilities, leasing facilities and safety locker service. There are several factors affecting customer satisfaction on providing these services in a virtual platform which is known as digital banking. In this research the most suitable factors affecting customer satisfaction on digital banking will be taken. Researches done related to ATM banking, online banking, mobile banking and general digital banking are taken into consideration in this chapter as to identify the most suitable factors affecting for this research.

In this research five commercial banks in Sri Lanka are considered namely, People's Bank, Commercial Bank, Nations Trust Bank (NTB), Sampath Bank and Hatton National Bank (HNB).

Research Body

There are several researches done related to factors affecting digital banking services on customer satisfaction. But there are lack of researches showing specific combination among the widely used digital services in Sri Lanka such as online banking, mobile banking and ATM banking. This research finds several literatures discussed previously and connects together.

Although there are retail digital banking services provided in Colombo, Sri Lanka by several banks, not all customers use digital services. And banks focuses on several factors when digitizing where there is no clear demarcation between level of impact of these factors on customer satisfaction. It can be identified that there is a problem for banks to identify the important factors affecting customer satisfaction when digitizing their services.

The population of this investigation were personal banking customers from the selected banks living in Colombo City range of all age groups, gender, income level and educational level. The primary data for this research was collected using 100 questionnaires distributed manually and via emails to customers of considered banks. The factors considered in this research were reliability, security, cost, assurance, availability, convenience, service quality and responsiveness.

Data collected using questionnaires was analyzed through descriptive statistics. Bar charts, tables, columns charts were used for interpretation. Data was analyzed using Microsoft Excel and SPSS software. Quantitative research process was followed with deductive method. Both primary and secondary data was collected using cross sectional horizon. Simple random sampling method was used for this research.

According to the correlation analysis it was evidenced that reliability has a moderate positive correlation with customer satisfaction, security has a moderate positive correlation with customer satisfaction, cost has a weak negative correlation with customer satisfaction, assurance has a moderate positive correlation with customer satisfaction, availability has a strong positive correlation with customer satisfaction, convenience has a strong positive correlation with customer satisfaction, service quality has a moderate positive correlation with customer satisfaction and responsiveness has a strong positive

correlation with customer satisfaction.

Bestowing to the regression analysis it can be concluded that convenience and availability are the variables which largely impacts customer satisfaction in retail digital banking services.

Reliability, Security, Availability, Convenience and Responsiveness were found to be significant factors affecting customer satisfaction in hypothesis testing. Where results of Ahmed (2015) proves the same for Security, Availability, Convenience and Responsiveness. Result of Nupur (2010) matches with the result of reliability being significant in this research.

Moreover it could be concluded that there was a trend observed that people older than 51 years, people who earn more than LKR 200,000 are less likely to be satisfied with the retail digital banking services. And this can be due to their high expectations as they have might have more experience.

Based on the findings that Reliability, Security, Availability, Convenience and Responsiveness are the main factors affecting customer satisfaction in digitization of retail banking services in Colombo, Sri Lanka.

Correspondingly the retail digital banking services should be reliable. It is recommended for banks to have separate team in their respective internal departments to ensure this. Security is a crucial factor among online transactions nowadays. Likewise banks should have precautionary measures and contingency plans for customers regarding security risk of their assets.

Similarly in the modern world as people wish to perform banking transactions 24*7, the banks are advised to make their retail digital banking services available to customers throughout every day.

As all customers want to conduct banking activities with less time and effort it is recommended to make digital banking services convenient in all possible ways. For this the banks should improve more advancements on their information technology.

Banks are also suggested to reply as soon as possible for any concerns of customers related to retail digital banking services. Further the Sri Lankan government should encourage banks to make customers satisfied using digital banking services. As this will help to maintain green eco-friendly service and healthy competition in the society.

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Investigating the impact of effective leadership on employee performance in Business Organizations, Colombo, Sri Lanka

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Abstract

Today's competitive business environment, Effective leadership is one of most essential factor of business success and virtually anyone can make an effort to be a good leader (Amabile et al., 2004). According to Murphy (2013), Leaders are made, not born. Today's current scenario business organizations are struggle to survive in the market in the heat of competition. So therefore According to Leavy (2016), made a view is that there is a need to keep an eye on effective leadership: because it becoming increasingly significant in all business organizations. According to Wiley (2010), various studies have been done in the field of business, regarding the factors that increasing leadership effectiveness and its impact on employees' performance. Especially this research gives the understanding about the relationship between effective leadership on employees' performance (Lichtenthaler and Fischbach, 2018), particularly the business organizations in Colombo area, meanwhile to determine the relationships between effective leadership on employees' performance.

The main objectives of the study is to critically access the impact of effective leadership on employee performance, carry out a comprehensive theoretical analysis on effective leadership style on employee performance, determine possible issues on effective leadership and employee performance, identifying the most significant factors that lead to effective leadership and provide recommendations to overcome issues which increase leadership and employee performance.

Random sampling techniques were used in selecting a sample size of 150 out of 375 total population in Colombo area (in five selected company) and from the results obtained, it was evident that there were factors that enhance the leadership effectiveness and the results proved that effective leadership had an impact on the employees' performance. The Author's view is that, the study could contribute some valid findings to the managerial studies especially in the field of human resource management. It was recommended that the management must conduct a leadership management oriented training and developments for managerial people, so therefore the employees' performance level do not decrease.

Author Keywords

Leadership, Leadership styles, Leadership skills, Characteristics and qualities of an effective leader, Leadership effectiveness, Measurement of leadership effectiveness, Employee performance and Measurement of employee performance

Introduction

Effective leadership is a key element to create strategic move towards the business growth. Austin (2010), analyses the value of effective leadership and the human resources of the organization (the biggest asset), and also they (employees) are the

main drivers of the organization to contribute to achieve the corporate objectives. The direction and vision of the task only come from the leader, therefore the leader need to direct the team towards their goal to get best output from the employees (Daly et al., 2014). In addition, effective leadership is very important factor and that will help all the business organizations to set their objectives in order.

The main thing is that the business failure or success that depends on the leadership effectiveness and also on the other hand leadership will play a major role to enhance the employee performance in all levels. The Author feels that If the organization wants to survive (sustainability) in the market for the long run, the firm should give much priority to their employees and this depends on the effectiveness of the leaders.

Experimental

Descriptive type of a research design has selected to analyze the effective leadership style on employee performance at selected five companies including private and public sectors in Colombo, Sri Lanka (target population). According to Carpenter (1998), this type of a research mainly involving into more documentation parts and analyses of the current situation while observing the practical things in the environment. A total 150 (selected 5 (each 75 employees) private and public organizations within the Colombo area) participants (out 375 total population) were selected for the purpose of the research design to use simple random sampling technique based on the population of employees who were willing to participate in this study. In this way the research has designed to investigate the impact of effective leadership on employee performance and also how effectiveness of the leader will lead to make major changes in the employee performance.

Quantitative data was collected by a self administered but structured survey comprising of 20 questions with both closed and open ended questions. Questions that are created in an easy way to understand by the respondents. Questionnaire is designed based on the five parts (Part - A, Part - B, Part - C, Part D and Part E). Part A is giving an idea about research purpose to the participants and requesting participants to give honest answers and feedbacks. In questionnaire part B is analyzing about the democratic factors of the respondents, starts from age, gender, qualifications and designations. Part C is divided to question on the independent variable and developed questions to measure the effective leadership. Part D of the questionnaire is developed to measure the employee performance. Finally Part E is developed to thanks the respondents for the participation. Author feels that face to face interacting with employees while issuing the questionnaires given a platform for the Author to analyze the employees' mindset and capacity. So this situation will lead to get good and honest answers to make the research valuable. Finally The responses from 80 respondents revealed that their is a corelation between effective leadership on employee performance.

In addition, this research study will help to identify various aspects to increase leadership effectiveness and the employee performance.

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Remittance Expenditure Patterns: A Case of Remittance Beneficiaries in Wattala, Sri Lanka

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Abstract

The money sent back by the migrant worker is known as remittance income and it complicates the portfolio management of a household in terms of expenditure. The main objective of this study was to observe their remittance expenditure patterns. A survey was carried out in Wattala area using a structured questionnaire. The 'unskilled labour category' was purposively selected and 60 remittance beneficiaries were selected as respondents using simple random sampling. Collected data were analyzed using descriptive statistical tools. Majority of the respondents were in the age group of 40-50, educated up to O/L, and unemployed. Majority of the migrants had been male, highly concentrated in the Middle East countries, and the majority was employed in the factory sector. Low income and unemployment had been the major reasons for migration. The majority (48%) of the remittance income/month was between Rs:30,000 and Rs:50,000 and some were receiving more than 200,000 per month. 81% of households reported 60% contribution of remittances to the monthly household income. Remittance formed the only source of income for 28% of households. In terms of expenditure patterns, all households (100%) spent remittances to meet monthly consumption needs. Leaving aside consumption, education was the major expenditure category among others on which remittances were spent. In addition to that, remittances have been spent on children's education (85%), construction of houses (26%), extension and maintenance of houses (41%), settling debts (68%), health needs (28%), marriages (35%), investing on land, business & vehicles(22%) and savings (21%).

Author Keywords
Migrants, remittances, expenditure patterns

Introduction
Migration for work in the 21st century has become a popular way for individuals from impoverished developing countries to obtain sufficient income for survival (Adams, 2005). This income is sent home to family members in the form of remittances and has become an economic staple in a number of developing countries. There are a number of theories to explain the international flow of capital and people from one country to another (Bohra & Massey, 2011). International labour migration from Sri Lanka has grown in importance for the last several decades and the numbers have increased more than tenfold during the same period. The total number of out migrants of Sri Lanka on employment abroad at present is estimated to be 1.8 million (Central Bank, Annual Report 2012) while annually the outflow of workers is estimated to be about 250,000 people.

A remittance is a transfer of money by a foreign worker to an individual in his or her home country. Money sent home by migrants competes with international aid as some

of the largest financial inflows to developing countries. In 2012, according to the World Bank Report, $401 billion went to developing countries with overall global remittances at $514 billion. The economic impact remains contested among researchers; however, remittance transfers do draw people towards the financial services that are available to them.

Although information on how Sri Lankan recipient households use remittances is not yet conclusive, the above findings suggest that remittances can have an important impact on recipient households. A broader study by the International Monetary Fund (IMF) on remittances concluded that "remittances can help improve a country's development prospects, maintain macroeconomic stability, mitigate the impact of adverse shocks, and reduce poverty. Remittances allow families to maintain or increase expenditure on basic consumption, housing, education, and small-business formation; they can also promote financial development in cash-based developing economies (IMF 2005). Speaking to the role of the financial sector in facilitating remittances, the IMF study also concluded that long-run output growth resulting from additional investments in physical and human capital financed by remittances might be especially likely "where a well-developed financial system and institutions allow remittances to be effectively intermediated and efficiently used" (IMF 2005).

The main objective of this study was to observe remittance expenditure patterns. A survey was carried out in Wattala area using a structured questionnaire. The 'unskilled labour category' was purposively selected and 60 remittance beneficiaries were interviewed.

Methodology
This study focused on target population of remittances beneficiaries in Sri Lanka. For convenience, this study was conducted in collaboration with the Sampath Bank of Sri Lanka, which allowed access to the customers of different branches of the bank, some of whom were remittances beneficiaries. In respect of remittances inflow to Sri Lanka, Sampath Bank account for 6% market share. The geographical coverage of the study consisted of three villages, namely, Hekiththa, Handala, and Hunupitiya from Wattala divisional secretarial in Gampaha district, western province of Sri Lanka. The Statistical Report (2012) of Sri Lanka Bureau of Foreign Employment (SLBFE) reveals that Colombo, Gampaha, Kurunagala and Kandy as having sent higher numbers of migrant workers. As well as Annual Report of Sampath Bank PLC, Sri Lanka (2012) revealed that Colombo, Gampaha, Kurunagala and Kandy have recorded higher numbers of remittances.

Out of above four districts, the Gampaha district was purposively selected as the study area, as permission was granted to meet the customers of the Wattala branch of Sampath Bank PLC. Moreover, the Wattala branch of the bank is also dealing with a higher number of remittances customers compared to many other branches. The population of the Wattala area also multi-ethnic, representing the three major ethnic groups: Sinhala, Muslim and Tamil. Of the remittances beneficiaries, an unskilled cluster was purposively selected, since unskilled labour is a predominant feature of the migrant population of Sri Lanka. Data were collected using a pre-tested structured questionnaire. Collected data were analyzed using descriptive statistical analysis.

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Impact of Employee Satisfaction on Employees Performance in Sri Lanka's Software Industry

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Abstract

The main aim of the research is to identify the impact of employee satisfaction on employee performance in software industry, Sri Lanka. The main objectives are; to learn the concept of employee satisfaction, to evaluate factors that lead to employee satisfaction, to learn the concept of employee performance, to evaluate the correlation between employee satisfaction and employee performance and to recommend the techniques to improve the employee satisfaction.

The research was conducted in ABC Private Limited and factors lead to employee satisfaction were limited to six and they are Pay, work itself , supervision, promotion, training and development and co-workers' relationship. These were selected from the previous researches and the conceptual framework and six hypothesis were generated.

This is a hypothetico-deductive mode of research and has several steps were followed in the research. Survey was employed to collect the data and questionnaires were used for the purpose. Data were entered into SPSS and analyzed. Microsoft Excel 2013 was used to interpret them by generating bar charts and tables.

The reliability was tested to identify the internal consistency among the question. In addition to these correlation and regression analysis also were done. Correlation analysis resulted the highest significant strong positive correlation between work itself and employee performance and the lowest significant weak positive correlations were found between co-workers' relationship and employee performance.

Author Keywords

Employee Satisfaction, Employee Performance, Pay, Work Itself, Supervision, Promotion, Training and Development, Co-workers' Relationship

Introduction

In the present context employee satisfaction plays a major role in the IT industry, since the industry is vulnerable to potential losses arising due to lower performance of unsatisfied employees. The main problem in the IT industry in the present context is higher employee turnover due to the less job satisfaction (Lounsbury, et al., 2007). The withstanding of an IT company depends on its experienced staff. Therefore companies have to tackle the problem such as turnover of experienced staffs.

Loosing IT staffs are costly to the company both in employ in and business (Longenecker & Scazzero, 2003). According to Nanjamari (2013), employee job satisfaction minimizes the IT employee turnover and increases the employee performance. Khan, et al (2012) identified that, there is an impact on level of performance by the employee well-being. Shaikh, et al., (2012) indicates that, the facets of employee satisfaction has an impact on employee performance.

Employees are the vital assets and human resources of an organisation's existence and its development (Khan, et al., 2012). Therefore, maintaining employee satisfaction is the precondition of a company to increase the; rate of yield, rate of acting fast and the quality of the services provided to clients (Sageer, et al., 2012). Employee satisfaction is one of the most important factors which determine employee performance and employee turnover and, employee satisfaction and performance are crucial to sustain an IT firm in the competitive world. Productivity and performance of an individual employee are crucial factors in software industries to improve the performance, productivity and the profit of the company (Rasch & Tosi, 1992).

Research Body

However there are a few number of research about the impact of employee satisfaction on employee performance especially in IT industry particularly among software development related employees in the context of Sri Lanka. This research includes not only Software Engineers but also includes Software Architects, Database Engineers and Software Quality Assurance (QA) Engineers whose work related to software engineering. This research was done to identify the correlation between employee satisfaction and employee performance and measure the impact of employee satisfaction on employee performance in ABC private limited on behalf of software industries in Sri Lanka.

The conceptual framework has six independent variables and a dependant variable. Pay, promotion, work itself, training and development and co-workers' relationship are the independent variable and employee performance is the dependent variable.

Data collection had taken nine working days and it was gathered at once and the data was not collected before for the same research. The tool used to collect primary data, is a 5-point likert scale questionnaire and it is adopted based on Minnesota Satisfaction Questionnaire (MSQ) and Job Descriptive Index (JDI). The questionnaire contains 37 simple closed questions. Even though the adjusted minimum sample size is 116 respondents, the author selected 157 respondents out of 160 employees. The survey was be employed to identify the data, by providing hard copy of questionnaires to the relevant employees.

Pay, promotion, work itself, supervision, training and development and co-workers' relationship which lead to employee satisfaction have significant positive correlations with employee performance. The highest correlations were recorded between performances and work itself and the relationship was strong and positive. On the other end correlation between co-workers' relationship and performance was the lowest and the relationship is positive and yet weak.

Employee satisfaction has a positive correlation with employee performance among the particular employees. Based on the correlation analysis all the direct hypothesis were accepted and all the null hypothesis were rejected. In addition to this, based on the regression analysis resulted that employee satisfaction has 44.4% of the total variance of employee performance. Therefore employee satisfaction has a positive significant impact on employee performance and it is 44.4%. Therefore employee satisfaction is one of the predictors of employee performance.

Organisational strategic goals can be achieved before the targeted date through

increasing employee satisfaction thus increases the employee performance. Employee turnover can be reduced and employee retention can be increased by improving the Pay, promotion, work itself, supervision, training and development and Co-workers' relationship.Productivity and quality of the work which in turn reduces wastages and extra costs through higher employee satisfaction. Increase the diversity of the job title will increase the levels of promotion will increase the levels of employee satisfaction. The highest number of employees agree that the supervisor takes care of the complaint, in the way that the employees wanted. Therefore supervision should be improved by getting feed back from the subordinates.

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The Impact of Brand Equity on Customer Purchase Intention: A Study in Homecare Products in Sri Lanka

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Abstract

The topic of brand equity has been widely researched by many due its significant important towards business activities. However, research on impact on brand equity on customer purchase intention is limited. Furthermore, research on brand equity and its impact on purchase intention on FMCG home care products is limited and in Sri Lankan context it does not exist. Therefore, this study has been undertaken to identify the co – relation of brand equity on customer purchase intention of FMCG home care products market in Sri Lanka.

The research approach for this paper was deductive and quantitative research strategy was undertaken to collect data. The information was collected through cluster sampling targeting each different geographical area which has large population density. Total of 450 research questionnaires were sent and 402 filled questionnaires were received.

Collected results were thoroughly analyzed using SPSS the researcher has arrived at the conclusion that the Brand Equity has a significant impact on the purchase intention of home care customers of Sri Lanka.

Author Keywords

Brand Equity, Purchase intention, Home care, Brand Awareness, Brand Association, Perceived Quality, Brand Assets,

Introduction

Sri Lanka being limited in land mass has a small population. However, there are many home care products offerings by many organizations. This makes market very competitive, Therefore, it is utmost important for FMCG home care product marketers to learn whether brand equity has significant impact on the purchase intention on the said market.

Even though there are many researches for different markets under the above topic (Chang & Liu, 2007), a research for Sri Lankan home care product market was not undertaken before.

Therefore, this research was undertaken to identify how significant is the impact of brand equity towards purchase intention of homecare customers and it will aid marketers to streamline their marketing activities to focus on areas which contribute to purchase intention.

Research body

Even though there are many researches done in brand equity and its impact on customer

purchase intention, the researcher has identified a gap in Sri Lankan Home care market. The previously done research can be considered as a reference but it might not be able to able to applied to Sri Lankan context. Therefore, the researcher decided to conduct this research to fill the research gap in Sri Lankan home care market. Researcher developed research questions and objectives and did a literature review to gain knowledge from previous research.

Based on the previous research, it has been found that brand equity dimensions are, brand awareness, Brand association, Perceived quality and brand assets (Aaker, 1991). (Ukpebor & Ipogah, 2008) stated that a powerful brand has the ability to influence consumer mindset and build a strong association for the product through the brand. A research on home care sector was done and identified that high brand equity will generate higher consumer preference and impact purchase intention positively (Cathy, Cobb-Walgren, Cynthiya, & Donthu, 1995). Many previous researchers (Mahfooz, 2015); (Yousefi, 2016) are some researchers who has agreed that brand equity has a positive impact towards consumer purchase intention. Based on these findings of the previous research a conceptual framework was designed. Based on this frame work four hypothesis were developed.

In order to test this hypothesis, primary research was conducted. This research was based on the cluster sample research method, where the researcher focused on collecting data from six main cities namely Colombo, Galle, Kandy, Jaffna, Anuradhapura and Ampara which represent major town in different areas of the country. These towns generally have highest population in each area and ideal to collect samples since the researcher intend to collect information from consumers throughout the country. Total number of acceptable completed research questionnaire received was 402. Due to lack of geographical access and time researcher used google form to reach and collect information from the selected sample population. When preparing the research questionnaire another limitation face by the research is the length of the questionnaire due to many product categories of Home care market, the questionnaire was becoming too long. Which will actually impact on the response rate. Therefore, research limited the questionnaire in to four main categories of home care segment in Sri Lanka.

A reliability test was undertaken to verify the reliability of the data. Reliability test was done using Cronbach alpha since it is the most suitable and most popular method of measuring reliability in a questionnaire (Saunders, Lewis, & Thornhill, 2007). Since the questionnaire was prepared focusing on major four areas of home care product categories, reliability of each category was tested. Lowest Cronbach alpha in each category are as follows. Washing powder 0.751, Toilet Cleaner 0.7111, Surface Cleaner 0.767 and paper products 0.746. Then then information was analyzed for each four categories and a descriptive study was undertaken. It was found that brand awareness dimension has the highest score with 3.9444 mean with a std. deviation of 0.51721. Which means most of the consumers are aware of the brands the use. It has also been found that most respondents agree that there is an impact for their purchase intention with a mean score of 3.7868. Finally, A correlation analysis and regression analysis were conducted to identify the co – relation of brand equity towards consumer purchase intention of home care industry. It has been found that brand equity has significant impact of 77.3% towards the purchase intention of customer purchase intention. The

Hypotheses generated through conceptual framework namely, H1- Brand awareness significantly affect consumer purchase intention, H2 -Brand association significantly affect consumer purchase intention, H3- Perceived quality significantly affect consumer purchase intention and H4- Brand assets significantly affect consumer purchase intention were all found true and accepted.

As the final part of this research, the researcher has made recommendations by highlighting that marketers must improve functionality and quality of the products, find more ways to associate with the brand, to pay necessary attention to brand communications and show the financial strengths of brand to consumer to build confidence. Researcher also identified that brand trust and brand image aspect should be researched in future to get a better idea on consumer confidence on purchase intention.

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The Impact of Motivation Factors on Employees' Turnover Intention in the BPM Contact Centre Industry of Sri Lanka

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Abstract

The BPM/BPO sector is one of the fastest growing industries in Sri Lanka contributing to high export revenue and creating many job opportunities in the country. Therefore understanding the dynamics of managing its employees while ensuring profit optimisation and increased stakeholder wealth is important. This is a challenging task given that high attrition in the industry is one of the major issues it presently faces.

The workforce of an organisation is one of its most crucial assets and in an industry such as a BPM, the impact of not having the right number of resources at a given time will result in the organisation not meeting service levels and therefore have critical impact on its operations. Therefor the analysis of how certain factors impact turnover intention will enable the management of such organisations to develop early warning systems and strategies to retain best talent and manage attrition better.

The objective of this reseaerch was to identify the motivational factors that impact turnover intention amongst customer service associates in the BPO/BPM industry in Sri Lanka. As a result of identifying motivational factors, this study will this study will also recognise factors that contribute towards retention and attrition thereby enabling the management of such organistaions to minimise attrition.

Data required for this study was gathered from 200 questionanaires that were distributed amogst staff of one of the largest BPOs in Colombo Sri Lanka. The random sampling approach was used for this purpose.

Previous research and theories were used as the basis for this research where the responses to the questionair and analysis of data has proven that motivation factors have an inverse corelation on employee turnover intention in the BPO/BPM sector in Sri Lanka.

Author Keywords

BPM/BPO Industry, Motivation, Turnover Intention, Supervisor Support, Remuneration, Career Development, Work Environment

Introduction

This study is carried out in a BPM Contact Centre in Sri Lanka. Contact centres are fast growing business models in the service industry and many jobs for call centre agents have been created in the past years for this purpose (Baumgartner, Good, and Udris, 2002; Holman, 2003). These services are outsourced by a range of service industries such as Airlines, Telecommunication Companies, Hospitality Sector, Banks & other financial institutions.

The Sri Lanka Association of Software and Service Companies (SLASSCOM) - the national chamber for IT/BPM industry in Sri Lanka, confirmed that the country is recognized as an immerging preferred destination of choice for the BPM market. Further Sri Lanka's BPO/BPM industry has grown by 23% and is steadily growing following the end of the ethnic war. This study is carried out within Dialog Business Services – a fully owned subsidary of Dialog Axiata PLC – one of Sri Lanka's largest telecom service providers. It is the largest BPM/BPO serving a single industry in Sri Lanka and therefore can be recognised as a representation for the industry. Further due to limited resources available, the researcher has selected DBS as she is also employed in the same organisation.

Employee retention is a very significant issue in the BPO sector (Kumar and Arora, 2012) and increased or uncontrollable levels of attrition need to be monitored and managed cautiously as they directly impact an organisation's performance. The challenge posed in the present context is for organisations to focus their efforts towards understanding millennial behaviour as a major portion off hiring is of school levers and young professionals.

Hence this research is conducted to understand what factors contribute towards motivating employees in this industry in an effort to control attrition and increase retention.

Research Body
While there are several studies carried out on attrition, there's very little research done on what impacts retention (Sengupta and Dev, 2013). This study aims to identify factors that impact an employee's intention to leave the organisation and what impacts their intention to stay. Further, this study is unique as previous research is not specific to the Sri Lankan context.

Kim and Park (2013) highlight that irrespective of the industry the human resources of the organisation are the determinants of the organisation capability, its effectiveness and overall performance. Organisations invest heavily on replacing employees in terms of hiring, training and developing until they meet satisfactory levels of performance (Collins and Smith, 2006). Moreover uncontrolled levels of staff attrition will impact the level of quality, consistency and overall stability of services provided to customers (Trevor and Nyberg 2008). This will eventually lead to customer dissatisfaction with regard to the service provided by the organisation (Lin and Chang 2005). Customer dissatisfaction is a direct performance indicator for a service provider such as the sector in consideration in this study.

Motivation is a multidimensional concept and therefore researchers have identified that individuals have different level and various types of motivation as well (Ryan and Deci, 2000). A thurough review of littereture identified that pay, supervisor support, career development opoortunities and work environment were key factors that contributed towards employee motivation.

The convenience sampling method was utilised for this study where 200 questionaires were distributed to the sample population. The questionair consisted of 27 questions pertaining to demographic data and motivational factors.

The findings of the study confirmed that pay, career progression and work environment had statistically significant corelation with turnover intention and supervisor support had the least. The study demonstrated that sufficient and competitive pay, significant supervisor support, structured and transparent career progression plans and a positive and appealing work environment lead to motivated employees and would thus create organisation commitment and will result in less turnover.

In conclusion, organisations are recommended to focus on these areas that impact employees the most in order to curtail and control attrition in the BPM Contact Centre industry in Sri Lanka.

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The impact of ethical business practices towards consumer purchasing intention: a study of the Sri Lankan retail fashion market

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Abstract

'Ethics' refer to moral demands related to a business that would affect the relationship between the business and the society (Goel and Ramesh, 2016). The conversation around ethical business practices and sustainability has been around for decades, starting in 1987 with the Brundtland's report (de Brito et al., 2008). Even though many studies have been conducted to understand the impact of such practices towards consumers, sufficient research was not found in terms of the Sri Lankan context, especially for the fashion industry. The aim of this study was to understand to what extent ethical business practices impact consumer purchasing intention.

A deductive approach was used for this research along with a secondary as well as primary research techniques. In primary research both qualitative and quantitative data collection methods were used. Qualitative data was used to understand the nature and the determinants of the ethical business practices in the Sri Lankan fashion market.

A questionnaire was conducted through convenience sampling that resulted in 299 responses. Collected data was analysed using the SPSS software. The conclusion of the results was that certain determinants of ethical business practices has a significant impact on consumer purchasing behaviour.

Author Keywords

Ethical business practices, Sustainability, Ethics, Consumer purchasing intention, Consumer concern, Manufacturing and design, Human resources, Ethical fashion, Ethical consumer

Introduction

In today's business world profits are not considered as the only important aspect of a company. Many leaders accept that ethics too should be given the same importance as profits (Sheppard, 2018).

The study of the relationship between the ethical practices and consumer's buying behaviour has been done by many researchers over the years. Many of these studies were based on ethical consumerism, socially responsible businesses, sustainable fashion and ethical fashion (Shen et al., 2012, Chan and Wong, 2012, Domeison, 2006). A majority of these studies show a positive relationship between the two variables. Even though there are many studies of similar nature done for other countries and contexts the researcher was unable to find a research of this nature for the Sri Lankan context. Therefore, the aim of this research was to identify the level of impact ethical business practices has on the Sri Lankan fashion consumer.

This research would be beneficial to the fashion brands with ethical practices that currently exist in the market as well as for the emerging designers that are interested in launching brands with ethical practices. The findings of this research would also be of value to students and researchers who would like to conduct studies on similar topics.

Research Body
With many calculated adverse effects of apparel and clothing consumption towards the environment and the society, the global fashion consumer has started being concerned of how the products they buy are made which has led to the consumer demanding for transparency of the supply chain (Shen et al. Previous studies suggest that ethical consumerism and corporate social and environmental responsibility would take a significant role in the future of the fashion industry.

With the current developments in the Sri Lankan retail market Ranaweera and Halwatura (2014) claim that the annual earning of local retailers itself is exceeding US$10 million and that the fashion retail market has a potential of growing into a US$500 million industry in the next few years. Due to the limitation of not being able to find sufficient studies or research articles on this topic for the Sri Lankan context the researcher of this study did a discussion with 20 local fashion related companies that have implemented ethical practices in their businesses. While many of them believed that the ethical practices could be considered as a competitive advantage of their brands and that they are making a significant change in the market, many of them were not confident if the customers had sufficient knowledge about their brands. Therefore, the need to understand where the consumer awareness of the ethical practices of such brands stands and if it actually creates an impact on the consumer's buying patterns as well as on the brand itself was highlighted. Based on the literature review the independent variables of the study were ethical business practices in marketing, ethical business practices in design and manufacturing, ethical business practices in human resources, consumer knowledge and consumer concern, where as the dependant variable was consumer purchasing intention.

In order to collect data from the consumers of the fashion retail market a self-administered questionnaire consisting of 32 simple questions was used. Questions related to the independent variable and dependent variable were done in the format of a five-point Likert scale. 299 responses were acquired with 100% validity of information. All data was entered into the SPSS software system with the values received as responses. The data was processed by SPSS and statistical analysis was done. Based on the sample overview analysis it was assumed that the sample chosen for the survey reasonably represents the fashion retail consumers of Sri Lanka.

A reliability test was done based on Cronbach's alpha and a frequency analysis was done to evaluate the responses received for each dimension of the independent and dependent variables. Correlation analysis was done to determine the relationship between the dimensions and a multiple regression analysis was done to measure the impact of ethical business practices towards consumer purchasing intention.

According to the correlation analysis, the determinants of ethical business practices that had a significant positive relationship with consumer purchasing intention were ethical

business practices in design and manufacturing, ethical business practices in human resources and consumer concern. As a result of the multiple regression analysis it was found that ethical business practices in design and manufacturing has the highest impact on consumer purchasing intention followed by consumer concern.

The relationship between the consumer purchasing intention and ethical business practices in marketing and consumer knowledge were analysed to be insignificant.

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Impact of Celebrity Endorsement on Consumer Purchase Intention: A Study in Sri Lankan Fairness Products Industry

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Abstract

Advertising is widely using as a communication tool in fairness products marketing since it helps to grab customers' attention and to create customer's loyalty to fairness products' brands. Celebrity endorsement is a main advertising technique which is being highly used by Sri Lankan fairness products marketers as they believe that this technique could influence directly on purchasing intention of consumers. Therefore with the intention of achieving a high market share, the most of popular fairness products advertisements which present currently on Sri Lankan media are endorsed by international or local celebrities.

So this research study examined, to which extent celebrity endorsement could effect on purchase intention for fairness products in Sri Lankan context, using TEARS model. According to this model, relationships between celebrity endorser's five key attributes (Trustworthiness, Expertise, Attractiveness, Respect, Similarity) and purchase intention were analyzed.

For this study non-probability convenience sampling techniques was used. Data was collected by distributing 400 questionnaire at popular shopping centers, cosmetics shops and fancy shops in Colombo district.

Findings of this research revealed that all five celebrity attributes are having positive relationships with purchase intention and also those relationships are significant. But the highest impact on purchase intention was shown by attractiveness. Respect showed the lowest impact while other three attributes showed a moderate impact on purchase intention.

Author Key Words

Celebrity Endorsement (CE), Endorser, Trustworthiness, Expertise, Attractiveness, Respect, Similarity, Purchase Intention (PI), Sri Lankan Context, Advertising, Marketing, TEARS model.

Introduction

Today in Sri Lanka, being fair has become a common trend and most of the Sri Lankans believe that fairer skin is more acceptable than a darker skin in the society. Not only Sri Lankan women but also men are equally using fairness products to enhance their skin color. Therefore there is an intense demand for fairness products among Sri Lankan consumers. It has become one of the rapidly growing and competitive market in Sri Lanka.

With the intention of achieving a high market share, most of the popular fairness products advertisements which present currently on Sri Lankan Media are endorsed by attractive

international or local celebrities with grace and elegance. And marketers and advertisers are spending money enormously on this celebrity endorsed advertisements.

This research mainly focus to investigate to which extent celebrity endorsement (as a promotional method) could impact on both Sri Lankan men's and women's purchase intention towards fairness products. And also to analyze 'how celebrity endorser's attributes (in TEARS model) effect on purchase intention of Sri Lankan customers towards fairness products'.

Research Body
A few studies have been carried out in Sri Lanka for investigating the relationship between celebrity endorsement and purchase intention with regard to different sectors and also for different types of products. But this relationship has not been investigated specifically for fairness products with relevant to both Sri Lankan males and females. A considerable research gap is existing regarding this relationship towards fairness products within Sri Lankan context. Researcher is trying to fill that gap through this research.

Number of research have concluded that celebrity endorsement positively influence for accomplishing intends of advertising (e.g. Freiden, 1984: Mathur et al., 1997). Even though this seems as a safe strategy, just like in other effective marketing strategies, this is also associated with some potential hazards (Erdogan, 1999).

Selecting of a celebrity out of numerous alternatives for endorsing a product/ service is very challenging. (Erdogan, 1999). By selecting a right celebrity, marketers can position a new product effectively. A successful celebrity program could transform a negative discernment about a product/ service which has been advertised already (Van der Waldt et. al., 2009).

Being this study deductive and descriptive and quantitative in nature, it went through sampling, data gathering and analyzing of those data. Survey method was used as the data collection technique. Non-probability convenience sampling technique was used to collect data. Even though 384 is the minimum sample size, 400 questionnaires were distributed at popular shopping centers, cosmetics shops and fancy shops in Colombo district.

Findings of this research reveal that celebrity endorsement has 47.3% of significant positive impact on consumer purchase intention towards fairness products in Sri Lankan context. Even though consumers highly perceive respect attribute of celebrities in current fairness products advertisements in Sri Lanka, it possessed a weak impact on PI and the highest impact was shown by attractiveness. Therefore attractiveness is the most important attribute for celebrities when endorsing fairness products in Sri Lankan context.

Findings of this study suggest that marketing managers/ advertisers should have to give more attention for TEARS model's dimensions while selecting celebrities for fairness products advertisements for Sri Lankan context. They should highly concern celebrity attractiveness when selecting an endorser for fairness products advertisements, rather than celebrity respect, but also have to concern about similarity, trustworthiness and

expertiseness since those attributes also showed a moderate impact on PI. Fairness products companies should not need to spend more money on emphasizing celebrity respect but need to spend more on emphasizing celebrity attractiveness.

For future research, author suggests to carry out same research for single celebrity endorsement vs multiple celebrity endorsement. Also author encourage future researchers to investigate whether celebrity endorsed advertisements have a significant impact on PI towards fairness products when compared to advertisements without celebrity endorsements in Sri Lankan context.

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Impact of Social Media in Divisional Secretariat Offices in Ampara District

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Abstract

Today, Individuals communicate easier and faster due to the accessibility of the Internet. However, when employees are using social media in Divisional Secretariat (D.S.) offices in Ampara District, it can become a concern for government of Sri Lanka. This paper concerns social media and its implications in D.S. offices in Ampara district. The structured questionnaire was issued among the selected DS offices in ampara district and employees were requested to fill the questionnaire. Based on the analysis, it was identified that the usage of social media for personal reasons was significant and it affects the number of working hours on daily basis and efficiency of the work. Therefore, it is suggested to develop proper policy, guideline and mechanism in order to avoid any adverse effects out of using social media during office hours.

Author Keywords
Social Media, Divisional Secretariat, Productivity

Introduction (headlines: Arial Bold Italic 10pt)
In brief 'social network' imply 'technologies that promote cooperation between individuals using information or data' or 'technologies that expedite and ease conversation' (Harper, 2001). Above definition stands etymologically. Theoretically social network sites can be defined as web based services that grant individuals to construct a profile within a bounded system, attach a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007, p. 211). In accordance with the history, SixDegrees.com is the first substantial social network site which was set in motion in the year 1997 (Boyd & Ellison, 2007, p. 214). After that blogging became very popular and in the year 2004 Facebook was launched as a social network site which only allowed Harvard students (Boyd & Ellison, 2007, p. 218). From September in the year 2005, Facebook was expanded allowing everyone to use it. Currently, gathering with social media sites are ubiquitous event in the world. By January end of the year 2015, 3 billion peoples have used internet. Among them 2.078 billion have active social media accounts (Williams, 2015). According to the Statistics Portal (2015) Facebook is the most popular social network with 1.49 billion users. QQ1 and Whatsapp secure the second and third places respectively, with 832 and 800 million users.

Experimental
Primary data was collected by using structured interview method. The sample of this study was selected using random sampling. And it was selected from the Ampara district since ease of access and number of divisional secretariat offices are location in Ampara district in Sri Lanka. Divisional Offices such as Sainthamaruthu DS office, Kalmunai DS

Office, Karaitivu DS Office and Nintavur DS office were selected for the 200 sampling which spread across Ampara district.

The collected data analyzed using SPSS, R and MS-Excel software. To identify the relationship between variables, chi-square test of independence and Fishers Exact test were used. Technically, when the chi-square test of independence assumption (the value of the expected cell frequency should be 5 or more in at least 80% of the cells) was violated.

It was identified that most of the government employees do not have any work related objects or reasons to rely on social media especially during the office hours. Most of them use Social Media to communicate with friends and family.

This study revealed that age is the main factor that decides for having or not having a social network site account. But it is not drastically affected for having or not having a SNS account. In workplace majority of the employees accessed to SNSs. Which means that there is a high level of SNS usage among government employees at the office.

Thereby government organizations should create their own set of rules, guidelines and policies to reduce the wasting time. Also monitoring the employee behavior on SNSs is a better way to effectively manage the use of SNSs by the government employees

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Challenges Confronted by The Undergraduates Offering English Medium Instruction in Sri Lanka

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Abstract

This study examines the language related challenges faced by newly registered students who attempt to follow their higher studies and adjusting to the demands of English medium. This research reveals that the problems faced by students in each and every courses in state universities specially in South Eastern university. The study is based on the findings of the south eastern university students who completed their higher studies after A/L The findings gathered through semi-structured interviews conducted at regular intervals over their three years of study at their alma mater. These findings are supplemented by the results of a questionnaire survey completed by around 50 undergraduates of south eastern university. The actual problem is in understanding technical and term vocabularies, communicate among colleagues, face exam, and attending lecturers. The evidence suggests that students are able to overcome these and other problems through a combination of strong motivation, hard work, effective learning strategies and supportive peer networks. To illustrate and personalize the first-year experience, of 20 students who are working in industry filed and academic field after completed their higher studies they shared the complications and how they overcome their barriers.

Keywords

English medium, Higher studies, Students, Semi- structured interview, Undergraduates, Supportive peer network, State and private university.

Introduction

English was the language of government administration under the British rule (1796–1948) in Sri Lanka as well as the medium of instruction in the prestigious universities and non-government institutions. English became the inevitable tool for government employment, social mobility and prestige which created two 'nations' in the country: one which spoke English and enjoyed the fruits of social development and the other which spoke Sinhala and Tamil and lived in utter frustration and hopeless-ness (Jayasuriya 1969).

Many research works have been done in this respect globally as well as indigenously. In most of the researches, it is found that students are facing problems with respect to the medium of instruction. More recent research findings indicate the ineffectiveness of using English as the medium of instruction and the difficulties encountered by the students and how they can overcome from that issue. The present study will have important implications in educational discipline. By evaluating the effects of change in the medium of instruction, we can formulate suggestions for the educational institutions to remove the problems in order to enhance academic achievement of the students.

This situation now is said to be forcing many higher education institutions to become international so that they can attract students from the international education market. The current situation does also explain why the terms "internationalization" and "englishization of higher education" are now closely associated (Coleman, 2006; Phillipson, 2002 and 2008). That is to say, shifting to instruction in English and thus becoming international would offer institutions the opportunity to attract international students and teaching staff and so increase their academic prestige. Ultimately this research attempts to study the factors that helped to the past out students form those higher studies institutions.

The general objective of this research is to reveal the difficulties faced by the students who were following higher studies in English medium in state and non-government academic sectors. And also how they overcome from that effects. The research is also guided by the following specific research objectives.

To understand the actual problem of sudden conversion to English medium.

To get clear concept on how overcome from it.

To know Boon and bane of English medium in higher studies.

Literature Review
The same difficulties exist in the Asian context as well. Domingo's study (2015) on the Filipino students says that Filipino and English or Code Mixing is well received in the classroom secessions which is also suitable in the other Asian countries. Graddol□s study (2010) revels that in India students face difficulties because of "the double burden of mastering their subject" (p101).

Also Jusuf Ibrahim investigates in his study among the students in Indonesian universities (2001) that EMI has its own difficulties among the university students due to "its classroom-based nature" and he further goes one step and says "there is a great possibility that EMI will not improve the four language skills equally for both students and teachers" (p 135).

This is the view of Silalahi Wolter Parlindungan and Sitorus Friska RIA (2015) who say "Teaching English as a foreign language is a challenging. Since English is as a foreign language in Taiwan. Every student has some problems and also every teacher has his/her own ways to deal with. (p 1154)" The same case exists in the Sri Lankan context because Sri Lanka also has the same Asian background as Ibrahim indicates "traditional teaching methods do not allow students and teachers opportunity for a maximum second language acquisition and literacy" (p135).

The cooperation of teachers is also an important factor which contributes a lot in the adjustment of students whose medium of tutoring is changed. This finding also permitted the research question. This finding see eye to eye with the finding of Sanders and Jordan (2000) which showed that optimistic teacher-student relations enrich academic attainment.

The results revealed the responsible factors which effect on academic achievement of

the students due to change in the medium of instruction. Maximum frequency (115) is of the factor which is the title of the research itself, that is, due to changes in the medium of instruction. The findings approved the research question. This finding corroborates the findings of previous researchers, who reported similar findings (Sabri, 2007) in which it was concluded that students who were taught in a foreign language (English) had more misconceptions than the students who were taught in their native language.

The students, who face less cooperation from the teachers' side by side with the language problems, also have poor academic achievement. This finding is corroborated by the finding of Adediwura and Tayo (2007). They concluded that students' perception of teachers' knowledge of subject matter, attitude to work and teaching skills has a significant relationship to students' academic performance.

It is also observed in Roger's (2012) research that institutions whose target is to increase English Language proficiency through EMI must have separate and comprehensible instructions with the support of the teachers. Also it must be supported with pre-academic programs which could be conducted after the lecture hours for the weaker students.

Methodology
The study was based on a mixed qualitative and quantitative approach and a survey research design was adopted to collect relevant data from the participants in the research. For this study 50 students have been selected who had scored below 40% in their First Year of study in the General English examination at the end of their first semester. Below 40% in the examination is generally considered "fail" by the university system in Sri Lanka, and those who score this marks have to repeat the examination in the forthcoming and subsequent semester. The total population of the class is 166. A questionnaire was distributed to them for data collection and group discussion and individual interviews had been conducted to ensure the collected data through the questionnaire. Further, 10% of the rest of the samples from the same batch of students were also interviewed to check the impact on EMI on the English Proficiency Level.

The questions that was asked through an interview.
1. Does the change in the medium of instruction has an impact on students' academic achievement?
2. Does the level of satisfaction of students make any difference in the academic achievement of students?
3. Does cooperation from lecturers positively influence the academic achievement of students?
4. Does confidence of students, enhance academic achievement of students?
5. Do previous English skills affect academic achievement of students?
6. Is living in the hostel affect academic achievement of students?

Findings
Background of the Students

samples are Tamil and 27 samples are Sinhala at south Eastern University of Srilanka Management faculty's all four departments.

• Department of Accountancy and finance.
• Department of Management.
• Department of management and IT.

Most of the students come from the rural areas (73%) and the rest are from the urban/ semi urban (27%) and all them studied in their mother tongue and none of them studied in EMI at the secondary (school) level.

Performance in the School Level in General English.
The following tables show their pass levels in their General Certificate of Examination (Ordinary Level) and General Certificate of Examination (Advanced Level) which are generally denoted as GCE (O/L) and GCE (A/L) in Sri Lanka:

GCE O/L

Grade	A	B	C	S	W	Total
Number	6	5	15	14	10	50
Percentage	12	10	30	28	20	100

GCE A/L

Grade	A	B	C	S	W	Total
Number	0	1	4	13	32	50
Percentage	0	2	8	26	64	100

Performance in the University Level in General English. After registered to University (1st year semester I)

Grade	C	D	E	Total
Number	47	3	0	50
Percentage	94	6	0	100

Passing rate in semester I in all subjects.

Results Status

15

35

■ Pass   ■ Fail
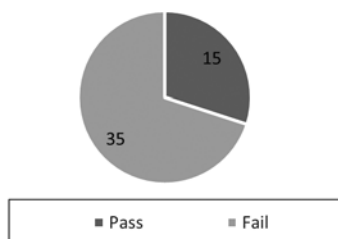
This results shows that only 15 students completed their all subject in their first semester exam rest of the students has repeat subjects. They supposed that the medium of instruction is one of the reason and the subject concept were default to understand due to English medium instruction.

Fail Students Details.

Number of repeat subject	Number of students
1	17
2	5
3	11
All subjects	2

The repeaters point out that the language is the barrier for them.

Research body

There are only 15 state universities in Sri Lanka under the direct administration of the University Grants Commission which controls funding and appointments. The prominent ones are University of Colombo, University of Peradeniya, University of Kelaniya, University of Sri Jayewardenepura University of Moratuwa and University of Ruhuna. Apart from the state universities controlled by the University Grants Commission, there are several other universities administrated directly by several government ministries. In recent years, with amendments to the University Act, a few institutes have been given permission to grant their own degrees: The most prominent is the government-owned Sri Lanka Institute of Information Technology.

There are many local and foreign professional bodies active in Sri Lanka such as Association of Chartered Certified Accountants, Chartered Institute of Management Accountants, British Computer Society, Association of Chartered Certified Accountants, etc. There are institutions provide entrance to professions such as the Sri Lanka Law College.

Vocational education and training in Sri Lanka are managed by the Tertiary and Vocational Education Commission of the Ministry of Vocational & Technical Training. Training includes course based curriculum at vocational technical training centers and apprenticeship at private or public organizations. Higher education in vocational fields could be archived though several universities. The National Vocational Qualifications Systems in Sri Lanka (NVQSL) provides a structured seven levels of qualifications from Level 1 to Level 7. Vocational education and training is carried out for degree level at the Open University, Sri Lanka and the University of Vocational Technology, as well as at diploma level at 37 technical colleges, Sri Lanka Institute of Advanced Technological Education[4] and the Sri Lanka School of Agriculture.

Learning English is not relevant to learners' purposes. They can't understand a lecture in English. They can't communicate in English (in daily or professional situations). They can't read their professional or common sense reading materials texts. They can't write

in English. Therefore, although their motivation to learn English is high, they achieve very little. Nevertheless, English is still a subject at higher education institutions. (p. 32) (Translation provided by the first author.)

There are two methods to give a ride to become a fluent student in English well. First on is language learning and second is language acquisition Language acquisition is the ability of the brain in its cognitive development & process to conceptualize concepts, structures and semantics in a language, while learning is the active participation and effort to learn a language. Language teachers devise methods as components of language acquisition, while learners use them to learn.

Conclusion

Based on the study, the students in EMI classes have difficulties in learning their language which does not have much influence on their main subjects. The students must develop their language skills. The universities must take effective training to the fresher. The first and second semesters in first year only the students had English subject. The universities must add English as a compulsory subject in whole year of study to the students. The year one, two, three and if they have specialization in their fourth year also they must be teaching English as a subject.

Further, whilst looking at their English Language proficiency in all four skills, they were almost lack in all. But after the English Language training, they are better except in speaking skill. As in Flowerdew et al.□s study (2000) reveals with the Hong Kong Chinese students of the BA classes, they were reluctant to ask and answer questions which were poised verbally on them. The same is applicable to this study that they are a bit reluctant to reply verbally, but they are ready to answer if the same question is given in written form. This may be due to their shyness in speaking in the classroom among other students.

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Impact of Parents' Involvement for Effective Student Progress

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Abstract

Education is one of the basic requirements of every single person around all over the world. Considering about Sri Lankan population educational literacy level is 96.3%. people involving in education for their career and some are studying while doing a job. A student with good education and good behaviors lead for making good citizen to the country. This cannot be achieve only with the student involvement but with their parents or guardians involvement too. This research has been done to check whether parent involvement is there with the new technological systems and to check whether such involvement lead to have positive effect on student progress.

Author Keywords

Student progress, Education, Attendance, Behavior, Parents, Communication, email, SMS

Introduction

Nowadays most of the government and private institutions providing best education but no one is much connected with parents. Some institutions not even have correct contact details of the parents. Therefore, there is a high tendency of students to in-attention on their studies because they know their parents are not getting any proper information of them at on time. Without parents impulse student won't do their work properly and also without parent's support an institute can't build a student with perfect behavior and with good attendance. Purpose of this research is make every parents to be connected with their son/daughters studies as well as make students with well behavior and also with best qualities. Main reason for come up with a system like this are,

- Poor attendance because of their parents are not knowing are they came and also being in institute or not.
- Some are not submitting the assignments on time because their parents are getting any messages regarding the assignments submissions time to time.
- Parents don't know whether their son/daughter paid the payments on time or not and not getting any messages regarding that.

Hence this research is focused on producing an effective student progress, by an automatic information system which can send all the academic processes, attendance updates and payment matters of students to their parent as per the request of parents by email or short message system (SMS).

Experimental

A survey has been done to evaluate the involvement of parent with the developed information system. And it has been found that, with the awareness of this newly

developed system parents have involved much in higher rates than earlier.

Following chart shows how the parents' involvement happened for 8 months with and without the system.

Parents Involvement with and with system

Student Count: 40

Months	without system (visits + calls) counts	With system (visit + calls) counts
Jan-17	8	
Feb-17	12	
Mar-17	14	
Apr-17	16	
May-17	19	
Jun-17	14	
Jul-17	13	
Aug-17	11	
Sep-17		26
Oct-17		28
Nov-17		16
Dec-17		31
Jan-18		36
Feb-18		34
Mar-18		38
Apr-18		26
Total	**107**	**213**
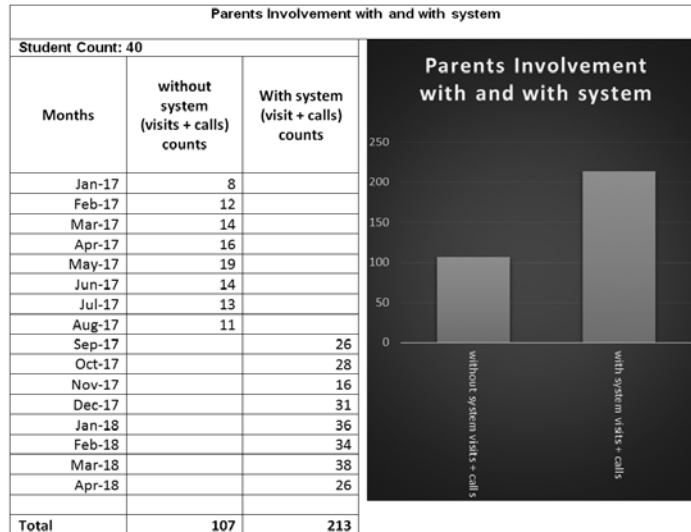
Attendance of the students have been marked with the fingerprint scanner and stored in the database. From those records it has found that students with less attendance (<=50%) has improved their attendance rate with the awareness that parents get about their attendance.

Follwing chart has been configured for the student count of 9 out of 40,as they had poor attendance rate which is less than or equal to 50 (<=50%) hence this research has proved that with the system students attendance is increased.

Attendance analysis

Student Count:9 \40

Name of the student	First two semesters without system	Next two semesters after system implemented
Student 01	49%	71%
Student 02	34%	34%
Student 03	35%	79%
Student 04	38%	35%
Student 05	42%	93%
Student 06	36%	89%
Student 07	37%	92%
Student 08	42%	93%
Student 09	41%	88%
maximum percentage of improvement with and without system for 100%	42%	93%
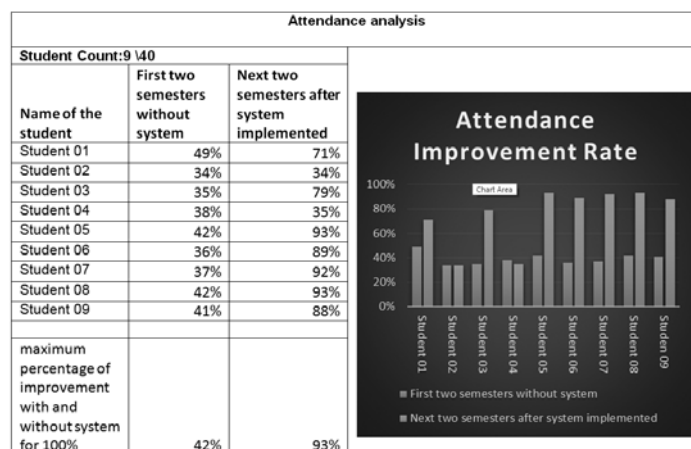
Once the payment is completed by the student it has recorded in this system. Following chart shows that the increasing rate payment on time completion with the implementation of this system,for the experimental purpose,the students had on time payment completion rate(<=50%) has been taken has a bench mark. It proved that students' on time payment rate has increased with the system implementation.

Onetime payment completion rate analysis

Student Count: 10 out of 40

	Ontime payment rate for first two semesters without system	Ontime payment rate for last two semesters with the system
Student 01	30%	65%
Student 02	100%	100%
Student 03	10%	70%
Student 04	35%	35%
Student 05	40%	90%
Student 06	25%	70%
Student 07	30%	80%
Student 08	40%	95%
Student 09	45%	80%
Student 10	20%	80%
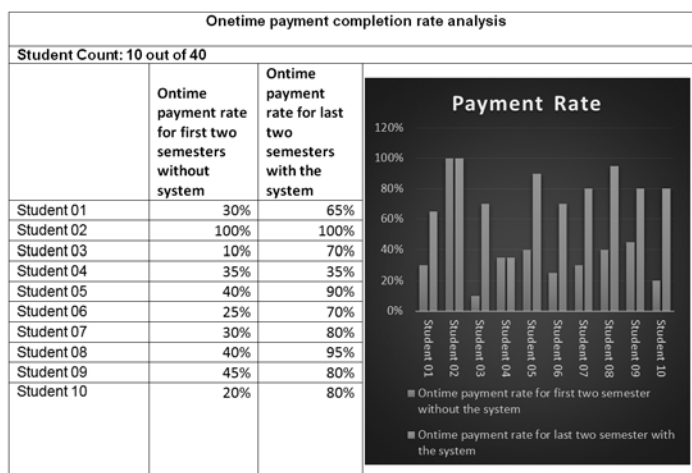
Similarly as above criteria,assignment submission rate also has been improved with the usage of this system. In order to check that students with less submission rate(<=50%) has been taken for the analysis and proved that students' assignment submission rate has increased.

Assignment Submission analysis

Student Count: 12\40

	Submission rate of First two semesters without system	Submission rate of last two semesters with the system
Student 01	25%	75%
Student 02	50%	75%
Student 03	25%	100%
Student 04	25%	50%
Student 05	25%	50%
Student 06	50%	100%
Student 07	50%	75%
Student 08	100%	100%
Student 09	50%	75%
Student 10	50%	100%
Student 11	25%	75%
Student 12	25%	75%
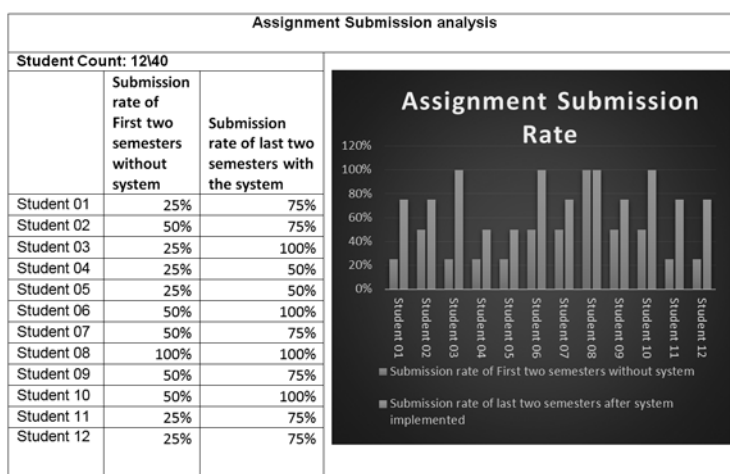
Conclusion

It has been proved by this research with this system parents' involvement in student activities has high positive impact on educational progress of student. Because this system has almost clearly proved improvements of parents' involvement with their son/daughters educational progress. In future this system can be implemented with other parameters like students' behaviors and soft skill performances also.

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Impact of Social Media on Academic Performance of Undergraduate: A Literature Review

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Abstract

The social media and related technologies are the sensation at this technological era and specially it has attracted the younger generation than ever before and the undergraduate students are not an exception to this trend. This study aimed to review the available literature on the effects of Facebook in particular and Social Media in general with regard to the undergraduate students' academic performance. Attempts were made to collect as many number of possible research papers and articles to arrive unbiased conclusion of its adverse and positive effects. However, based on the findings in literatures, suggested that its' excessive use adversely affected the academic performance of students in general. More importantly, by its nature, social media networks were seen as a mean for entertainment and to network with known and unknown people. The findings of this research recommends any higher educational institute which accommodate undergraduates to include an awareness programme or a non GPA compulsory module on social media to educate its advantages and disadvantages and how this technological invention can be utilized for the betterment of academic purposes in particular. Also, it was evident that the researches on the above topic is at its initial stage in the local context and findings may vary to the local context if studied further.

Author Keywords

Social Media, SNS, Facebook, Academic Performance

Introduction

Emergence of technological innovations into countries have always been both beneficial and disadvantageous. It is obvious that the rapid growth of technology and internet specifically has affected every aspect of life regardless of any demographical differences. Every technological innovation has been a topic of debate and drawn the attention of researchers and same is the case with the development of Social Networking Sites (SNS). Various researchers have conducted studies to pinpoint the several impacts of these sites on their users and findings suggested both bright and dark aspects. Hence, many countries gained open access to the Internet due to rapid advances in information technology within last twenty years (Kuppuswamy & Narayan, 2010).

In fact, the Worldwide Web, originally created in 1990 for US military forces, has become not only an effective instrument for the management of US army, but later a convenient tool that issued by civilians for communication, entertainment, and learning purposes. One of the most popular and recognized platforms used on the Internet are social networking sites such as Facebook.

The quick rise in popularity of SNS began in the second half of the last decade partly because of their extensive usage by school and university students. According to Ellison, Steinfield & Lampe (2011) Therefore, the overall objective of this study is to explore the existing literatures on the impacts of social media on the academic performance of undergraduate which will give an overall picture of this phenomenon and open ways for many researches to base upon.

Based on the literate reviewed, it was evident that researches conclude that the adverse impact is significant over the positive impact unless a proper guideline and mechanism are in place. Recent literature found that leisurely Internet use is strongly correlated with weakened academic performance (Kubey, Lavin, & Barrows, 2001).

Experimental
The main purpose of this research is to explore the literature available in respective of the impact of Facebook usage on students' academic performance. So, to attain the intended objectives, efforts were taken to collect as many number of research papers centric to the topic. At the beginning, few research papers were reviewed and then all the related research papers from the primary research papers' reference were collected. Internet was used as the medium to collect the existing research papers in the above topic. Since the present study is intended to respond to the questions of qualitative natures, such approach was taken.

Data sources are of secondary as the research deals with the existing literatures and it's also the primary source which is the data that the researcher has to collect in order to answer the questions.

Across disciplines, research related to the effects of social media use on college student academic performance, outcomes, and attainment is quite scarce. However, a few recent studies have focused on the impact of SNS use on academic performance and engagement. The studies have shown mixed results, possibly due to weakness of the self-reported measures, but the findings from a wider range of studies suggest that outcomes can vary depending on the ways in which students engage with the social media.

The findings of this study correspond to the outcomes of previous research that suggested extensive use of Facebook among college students. Thus, time spent on Facebook and addiction to it negatively affects students' academic performance. By the same talking, one study has corroborated the idea that SNS negatively affects student academic performance.
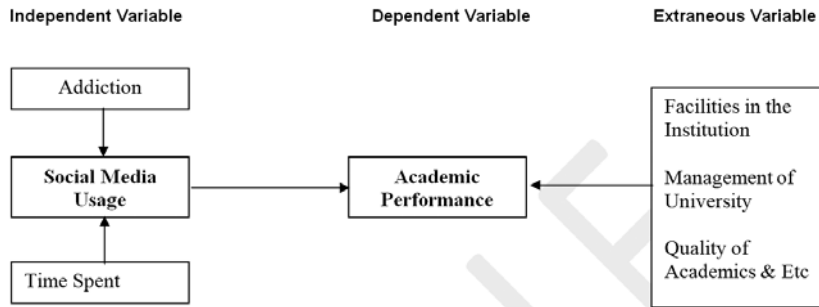
Figure 01: Conceptual Framework derived from the literature review
Source: The Researcher

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Effectiveness of extracurricular activities in studies of students

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Abstract

Extracurricular activities are one of the main aspects when considering of school aged students. These are done in order to uplift their personality and other soft skills. But most of the parents think this as a barrier for their children to go high in studies or education. But some argues that these extracurricular activities are really wanted for every single student. This research is focused on checking whether the student performance in studies is effective or not with the involvement of student in extracurricular activities. In order to check this, a student management system has been developed and practiced in a school at Matale, to record the marks of term tests, achievements of students, participations on competitions and other extra involvement in various school clubs/societies. After analyzing all the details of student for many years (at least for three years) reports have been taken on each factor marks and extracurricular activities of an individual. By analyzing above mentioned factors of an individual a clear clarification has been taken whether the extracurricular activities really effective or not in studies of a student.

Author Keywords

Extracurricular activities, Student, Studies, Marks, Academic performance.

Introduction

Education is one of the key sources for students to achieve a bright future. Schools have provided lots of techniques to improve their education. Extracurricular activities are one of them. But these have been mainly introduced specially to build up the personality and other soft skills of students. There is no any argument with the benefits getting by extracurricular activities, such as building up good team work, improving balancing skills (time, resources), identifying and developing hidden talents. etc. [1] But most of the people think that these extracurricular activities as a negative concept which break ones concentration on studies. Hence a research has been done to evaluate whether these extra activities are really effective in studies of students or not.

The developed student management system has done to achieve many requirements of the school. But for this research only some data taken from some functionalities have been used. Recording of students' term test marks is needed in order to calculate total marks, average mark and to analyze class position of a student. And also recording of extracurricular activities of individual will be very helpful for the school management when students are requesting character or leaving certificate. So that data collected from these two functionalities, which means recording of marks and extracurricular activities have been taken to do this research.

Methodology

In order to do this research, a girls' school has been selected (to limit the factors effect on intelligence of an individual) and data has been analyzed for three years from students who have learnt in grade 9.The reason to select grade 9 is that it seemed it is the most ideal grade that student get ready for Ordinary level exam and those who joined to grade 6, after scholarship exam have adapted to the school environment.

As mentioned in the introduction it is clear that student database has data about marks and extracurricular activities. And those data have been stored in the tables as follows.

Table_Mark

subject	year	grade	term	mark	admissionNo

Table_AverageMark

admissionNo	grade	term	average

Table_Student_Extracurricular Activity

admissionNo	extracurricular_Activity	category	joinedDate	remark

Students who have got average greater than or equal to 75(Average >=75) have been extracted using a query with the data in above tables, as average is the criteria which shows the academic performance of a student.

```
Query1-Students who study in grade 9 AND who has average>=75
SELECT Table_AverageMark.[admissionNo], Table_AverageMark.[grade], Table_AverageMark.[term],
Table_AverageMark.[average]
FROM Table_AverageMark
WHERE (((Table_AverageMark.[grade]) LIKE '9%') AND ((Table_AverageMark.[average])>=75));
```

Out of the above filtered students another analysis has been done in order to check their involvement in extracurricular activities. Here also a query has been used to extract the students who has obtained average>=75 and their involvement in extracurricular activities.

```
Query2-Students who has average>=75 AND involved in extracurricular activities
SELECT Query1.admissionNo, Table_ExtracurricularActivity. extracurricular_Activity , Table_ExtracurricularActivity.remarks
FROM (Table_Student INNER JOIN Query1 ON Table_Student.admissionNo = Query1.admissionNo) INNER JOIN
Table_ExtracurricularActivity ON Table_Student.[admissionNo] = Table_ExtracurricularActivity.[admissionNo];
```

Using above mentioned two queries, it is extracted only the student list who are not involving in any extracurricular activities.

```
Query3-Students who have average >= 75 but not involve in any extracurricular activities.
SELECT Query1.admissionNo FROM  Query1 WHERE  Query1.admissionNo NOT IN  (SELECT Query2.admissionNo FROM
Query2)
```

Similarly as above, another query has been used in order to extract students who has got average<=50 considering that these students have less academic performances compared to others who have >=75.

```
Query4-Students who study in grade 9 AND who has average<=50
SELECT Table_AverageMark.[admissionNo], Table_AverageMark.[grade], Table_AverageMark.[term],
Table_AverageMark.[average]
FROM Table_AverageMark
WHERE (((Table_AverageMark.[grade]) LIKE '9%') AND ((Table_AverageMark.[average])<=50));
```

Out of the above filtered students another analysis has been done in order to check their involvement in extracurricular activities. Here also a query has been used to extract the students who has obtained average<=50 and their involvement in extracurricular activities.

```
Query4-Students who study in grade 9 AND who has average<=50
SELECT Table_AverageMark.[admissionNo], Table_AverageMark.[grade], Table_AverageMark.[term],
Table_AverageMark.[average]
FROM Table_AverageMark
WHERE (((Table_AverageMark.[grade]) LIKE '9%') AND ((Table_AverageMark.[average])<=50));
```

And using above mentioned queries, Query4 and Query5, it has extracted only the student list who are not involving in any extracurricular activities.

```
Query6-Students who have average<=50 but not involve in any extracurricular activities.
SELECT Query4.admissionNo FROM Query4 WHERE Query1.admissionNo NOT IN (SELECT Query5.admissionNo FROM
Query5)
```

Similar type of above queries have been created to extract students who obtained average mark<75 AND >50.And their involvement in extracurricular activities also have been analyzed.

Experiment
The experiment done with above extracted data has summarized and analyzed as follows,

Year	Grade 9 Student Count
2015	215
2016	218
2017	221
Total	**654**

	Count/654	In Percentage%	Source
Students whose average >=75	262	40	[Query1]
Students whose average <=50	161	24	[Query4]
Others	231	35	

	Count/262	In Percentage%	Source
Students whose average >=75 AND involve in at least one extracurricular activities.	191	73	[Query2]

	Count/161	In Percentage%	Source
Students whose average <=50 AND involve in at least one extracurricular activities.	63	35	[Query5]

	Count/231	In Percentage%	Source
Students whose average <75 AND >50 involve in at least one extracurricular activities.	187	81	

Conclusion

From the above analysis it can be conclude that students with more academic performances have high percentage in the involvement in extracurricular activities. (73%).But those who are less in academic performance also have less involvement in academic performance (35%). And those who have medium academic performances have good and more involvement in extracurricular activities. (81%)This shows that academic performances can be still maintained in good condition while engage in extracurricular activities.

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Standardized and a holistic Early Childhood Education Curriculum

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Abstract

Education is not imparting of wisdom but creation of great personality.

Today's children would grow up to be the future leaders of this nation. The manner in which their physical, emotional and social well- beings are developed would have a direct impact on their future as an adult. Therefore, it is important that children are molded in a holistic manner right from the early childhood period.

Various studies show that children who attend high quality early childhood education (ECE) centers become more successful and gain considerably as responsible leaders. They also become independent decision makers with strong committed leadership quality to serve their community and society.

Unfortunately, in Sri Lanka both the ECE system and the curriculum are unregulated and are not inspected for good quality or suitability leading to different standards of ECE centers in various parts of the country. Most pre-schools in Sri Lanka follow the Montessori Method curriculum which emphasizes on hands on learning which is conducted by Association Montessori Internationale (AMI) qualified teachers, who actually deviate from the expected delivery methods and do not maintain a uniform standard.

This paper emphasis on the benefits of having a comprehensive and a standardized curriculum that could lay a strong foundation to the children to grow in a holistic manner and to be empowered to become strong leaders to serve the nation.

This will enable the children to transform themselves to become responsible leaders who would also be accountable for the sustainable development of the nation.

Author Keywords

Early Childhood Education (ECE), children, curriculum, holistic, leaders

Introduction

John F.Kennedy once said "Our progress as a nation can be no swifter than our progress in education. The human mind is our fundamental resource."

Education paves way to the success of every country but we must accept that a high quality early childhood education (ECE) creates successful citizens who could lead a nation. Although quality is constantly emphasized in all fields, quality in terms of education is very complex and cannot be defined (Reed, 2012). Yet, certain factors such as a safe and a nurturing environment, quality of the staff and the curriculum could create a great impact on deciding the quality of an ECE programme in a holistic manner.

Considering the quality of ECE in Sri Lanka, although there is a minimum requirement to maintain standard ECE centers, the existing guidelines mainly focus on the infrastructure and there seems to be an immediate need for a high quality framework of standardized curriculum (World Bank, 2014).

A curriculum that addresses different needs of the individual children makes the learning process effective as it allows all the children to be engaged. An effective curriculum creates an environment where the children experience a natural environment which promotes cognitive learning and relatively increases the potential of every individual child (Michigan State Board of Education, 2005).

The Sri Lankan Ministry of Higher Education (MOHE) proudly notes Sri Lanka as the country with the highest literacy rate of 92% in South Asia (Ministry of Higher Education [MOHE], 2016). Despite this notable achievement some statistics show that the percentage of the children enrolled for primary level (Grade 1-5) is over 90% which gradually declines to less than 45% as these children move towards the higher grades such as grade 11-13 (World Bank 2014). One of the major reasons for this drastic drop could be that these children who enroll into the preschools are not supported in a multidimensional ECE process where a strong foundation could be laid on developing the children's cognitive, physical, linguistic and socio emotional skills. The government of Sri Lanka has estimated about 25000 pre-schools in both the urban and rural areas (King, 2015).Most of these pre- schools follow the Montessori Method which is based on hands on learning method where the teachers are diploma holders who in reality deviate from the hands on learning method (King, 2010).

Introduction to a Holistic Curriculum
When prioritizing the development and designing of a standardized ECE curriculum, I would like to suggest two major points which could upgrade the standards of the Sri Lankan children's pre-schools learning experience. This will enable them to prepare for (school preparedness) a holistic learning system in their schools.
1. Exploration
2. Empowerment

Exploration
First, it is important for all ECE providers to understand the fact that the children are born with a natural ability to explore and they begin their adventure right from birth. They try to understand their surroundings, communicate, represent and even develop their creativity through their own exploration (Ministry of Education [MOE], 2017).

Hence, a curriculum for ECE should incorporate child initiated play where the educators value play as a meaningful approach for learning. In Sri Lanka, child initiated play is generally considered as a non-academic activity for young learners, which is completely a contradicting concept. The educators must be educated and guided to use strategies to encourage the children to stimulate their thinking through questioning, reasoning and interacting with children during active play sessions. When children are provided such learning opportunities to explore that creates an interest on the lesson and they become more curious about what they need to learn. They also enhance their creativity along with confident to develop abilities to solve problems and working theories by

understanding the social, physical, natural and the material world around them. Further, it enables children to grow up as critical thinkers who develop positive attitudes which would influence their process of learning for the entire life (MOE, 2017).

Empowerment

Secondly, it is necessary that an ECE curriculum encourages its educators to empower their children while they empower themselves as well. When children are empowered at an early stage such as in a preschool environment they develop a broader understanding about themselves as capable and confident learners. A major percentage of today's Sri Lankan society seems to lack confidence and they also tend to underestimate their capability which ultimately leads to failures. Hence, an empowering curriculum would provide children ample opportunities to choose and to make decisions. It helps children identify their fields of interests, create and develop their own ideas. It would require children to set their own learning goals rather than compelling them to meet preset goals. It would also encourage the child being consulted about his/her next move instead of an external factor deciding the child's future plan (MOE, 2017). An empowered child would grow up to be a matured adult who could direct his/her own life making better choices, wise decisions, taking risks and facing challenges with confidence.

Conclusion

In conclusion, I would like to emphasis on implementing the suggestions that I have highlighted above. The relevant authorities will have to focus and prioritize the development of a comprehensive, standardized and a holistic curriculum for the ECE which would underpin all aspects of a child's learning and development. Compilers must also consider the children's physical, social, intellectual, emotional and spiritual dimensions within the context of their respective family and cultural backgrounds. Incorporating exploration and empowering within such holistic curriculum would definitely pave way for these children to grow up as adults who could be groom to be turned out to be a well-balanced responsible citizens and successful leaders of a nation.

This would ultimately lead to a paradigm change which would make a sustainable nation.

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The Impact of Service Quality on The Selection of Private Educational Institutions in Sri Lanka

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Abstract

Main purpose of this research is to identify the impact of service quality on decision of selecting private educational institutions in Sri Lanka. Though there are number of service quality dimensions, the study was based on SERVQUAL model five factors on the customer selection of private educational institutions in Sri Lanka. There are number of reputed and recognized educational bodies exist in Sri Lanka. Ideally from these, ten private campuses were selected and students of those were taken in to consideration. However, the results show all these five dimensions would have a direct impact on selection. The students seek reliability, tangibility, assurance, empathy and responsiveness throughout their academic life and then facilitate them to reward additional to battle within the industry. Further, the decision of selecting an institution is somewhat based on customer purchasing behavioral factors and promotional stimuli's in the market. Findings of this research helps the management of institutions to formulate effective marketing strategies to build in service quality practice to ensure a better quality of students to attract and retain more for their future programs.

Keywords

Service Quality, Education institutions, customer behavior.

Introduction

Education is an esteemed investment which awards a person's life in numerous ways. Today, a quality and productive educational system is vital and it's directly affect to students lives forever. Hence a decision of selecting a suitable education institution is critical by the parents for their children or by their own. In this way, service quality plays a big role in current day commercial competitive environment. It has become a critical marketing factor to keep or loosing of customers with their institutions in long run at a profit. Therefore, educational institutes must maintain a high standard of service quality to withstand the competition in the industry.

In Sri Lankan context, government is mainly responsible for all education; primary, secondary and tertiary, in free of charge. After 1970s, private institutions were established to provide education in the country due to number of reasons; development of the technology and knowledge, lack of facilities in government sector, expansion of job market etc. The demand for education especially tertiary rose rapidly and then the competition remains in too high. To fulfill these demand number of private educational institutes entered in to the market with financial and non-financial performance while improving service quality as a function to achieve unique proposition. In this nature private educational institution tries to optimize their service quality to attract more customers by providing them a better service with the support of marketing promotional activities put in front.

Generally, in customer's point of view, they always make decisions considering number of steps. (Saaty, T.L., 1994) First they gather information from relevant sources and then prioritize according to the requirement while compare with alternatives. Meanwhile customers used to analyze it and make the final decision according to their blended behavioral factors such as past experience, attitudes, perceptions, recommendations, lifestyles, cultural aspects etc. Moreover, marketing promotional activities and corporate image may directly or indirectly couple to make final decision towards the selection. (Aaker, D., 1996) (Biel, A., 1999) (Keller, K. ,1993). As per Howard (1994) there are six factors of the model of consumer decision making which three of central factors affect towards final decision ; brand recognition, attitude, and confidence. In this nature, selecting a private educational institution may be a decision of the student with a decision influenced by the family decision making unit ultimate.

Scope
The purpose of this paper is to identify the impact of service quality dynamics which are based on SERVQUAL model five factors; tangibility, reliability assurance empathy and responsiveness, on the customer selection of educational institutions in Sri Lanka. There are number of reputed and recognized educational bodies exist in Sri Lanka. Ideally from these, ten reputed and recognized private campuses were selected for current study due to limited span; ICBT, SLLIT, CENC, BCAS, IDM, ACBT, Segis, APPIT, Esoft, Auston.

The data was collected through self-administered questionnaire followed by mixed method of analysis; quantitative analysis method; MS excel 2010 ; qualitative – participatory action method. All these responses are recorded on a five point likert type scale. Further questionnaire describes the expectations and perceptions of service quality, customer decision factors as well as the brand image. In total, 75 students were given questionnaire those who currently enrolled in higher national diploma level and graduation program in western province private educational institutions, Colombo region. The sample comprised of both male and female students in equal ratio.

Numerous authors have explained number of theories and models on the context of service quality. Literature review on all the published outcomes on the above subject matter is elaborated with carefully selected model relevant to current survey for the analysis.

Aim & Objectives
The main aim of this research is to identify the impact of service quality on decision of selecting private educational institutions in Sri Lanka.

The secondary research objectives are;

1. To identify the service quality factors that impact on selection of private educational institutions in Sri Lanka.
2. To find out the relationship among the service quality, decision making in selection of private educational institutions in Sri Lanka.

Research Body

The definition of quality may vary from person to person and from situation to situation. The definitions of service quality vary only in wording but typically involve determining whether perceived service delivery meets, exceeds or fails to meet customer expectations (Cronin and Taylor, 1994; Oliver, 1993; Zeithaml, Berry and Parasuraman, 1993).

Excellent service quality helps differentiate one educational institution to another, gain competitive advantage and enhance efficiency and effectiveness of the service delivery. (Grönroos, 1984). In the context of service quality, SERVQUAL module (Parasuraman, Zeithaml & Berry 1988) is considered as key aspects in service sector organization. There is empirical evidence of service quality on sectors such as hospital (Babakus & Mangold 1992), airline (Huang 2009), hotel (Khattab & Aldehayyat 2011), higher education (Cardona & Bravo 2012), and furthermore the service quality dimensions amongst different cultures (Guesalaga & Pitta 2014). In this way Five dimensions of service quality; reliability, assurance, tangibles, empathy and responsiveness, are considered as key aspects of service quality when selecting of private educational institutions in Sri Lanka.

Having compared with other services, education systems are complex; academic quality, learning environment, customer care, recognition, legal aspects etc. It seems that the Sri Lankan private education is vastly expanding where many service providers also come up with different solutions; UK, USA, Australian and Malaysian educational providers transfer options. The most rational point is, studying in Sri Lankan private educational institutions comparatively affordable, no matter what country the degree is offered. In this context highly significant variables in the model that appear to directly impact on overall customer satisfaction with university performance. (Elliot and Shin, 2002) Hence, both academic and administrative issues of an institution are extremely important in determining the performance of students, development of organizational image (corporate reputation) and quality assurance. (Soutar and McNeil, 1996). Therefore it seems that customer are interested to know how the processes workout to deliver a better service (technical quality) and what they get returned as best (functional quality). (Grönroos, 1984).

Conclusion and Further Research

Based on the research findings, the results show that all these five dimensions have a direct impact on selection. The students seek reliability, tangibility, assurance, empathy and responsiveness throughout their academic life. Hence it shows that the service quality greatly influence the decision of selecting the institution. It shows that consumers and customers consider more on quality of teaching and learning environment of an institution as they demand qualified experienced professional academic staff from the faculty with friendly attitude. Similarly tangible facilities were demanded; infrastructure facilities do contribute in creating the image of excellence. Moreover the research found there is a relationship between service quality, consumer decision factor and branding of the company. Hence the decision of selecting an institution is somewhat based on customer purchasing behavioral factors; past experience, recommendations, attitudes, cultural aspects along with marketing stimuli's.

Findings of this research demonstrate opportunities for management of institutions to formulate effective marketing strategies to build in service quality practice to ensure a better quality while expand their commitment to customer service to attract and retain more for their future programs.

Future research should focus on the service quality, customer satisfaction and behavioral intentions in a variety of settings, when selecting a private educational institution, Sri Lanka.

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A study of use of defense styles among university students

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Abstract

The objective of this study was to understand the Use of Defense Styles among university students. with reference to the effects of Gender, Living Background and Educational Level. The Survey (questionnaire) method was used to collect data from total 260 University and College Students. The Defense Styles Questionaire-DSQ-40(Andrews et.al) was used to identify the defense styles. The mean differences between groups (male vs. female, urban vs. rural and undergraduate vs. postgraduate) were computed using t-test analysis. Use of defense styles showed that university students differ from one another group((male vs. female and Undergraduate vs. Postgraduate) significantly. With respect to gender in all three defense styles, With respect to level of education (college vs post graduate), in all three Defense Styles were shown but a significance difference in the use of defense styles was not shown between Urban and Rural Students.

Introduction

The objective of this study was to study the effects of Gender, Living background and level of education on use of Defense styles among Undergraduate and Postgraduate students in Mysore. The concept of defense mechanism goes back to the early literature of Sigmund Freud but the debate still continues. Usually defense mechanisms are defined as "automatic psychological processes that protect individual against anxiety and from the awareness of internal or external dangers or stressors. Individuals are often unaware of these processes as they operate. Certain defense mechanisms have an adaptive function and are thus identified as mature mechanisms. They are used by "healthy" individuals in normal situations. On the other hand, immature defense mechanisms are more defensive in general and are characteristic of higher levels of distress (Phaneuf, 2007). The concept of defense styles assessment gained popularity with the study done by Bond, Gardner, Christian and Siegel in 1983 to develop a questionnaire to assess three different defense styles (Martin, Valls, Rousseau & Chabrol, 2013). This questionnaire proposes three different defense styles adopted by individuals. They are "Matured defense mechanisms" (Anticipation, humor, sublimation and suppression), "Immature defense mechanisms" (acting out, autistic fantasy, denial, idealization, passive aggression, rationalization, splitting, and somatization) and "Neurotic defense mechanisms" (isolation, reaction formation, pseudo altruism, and undoing). The most commonly used version of this questionnaire is its 40 items version (DSQ-40).

The defense mechanisms of immature style are unreasonable and inefficient methods of the defense mechanisms(Dhakili, Manavipour, Golshali, 2013). Nemat (2008) showed that the individuals with poor mental health used immature and neurotic defense mechanisms more than those ones with good mental health did. Mohammad pour Yazdi, Birashk, and Dozhkam (2009) concluded that the members of the anxious group

used the mechanisms of mature defense style more than other groups did. The study of defense styles of university student has also attracted a considerable amount of literature in the present. Most of these researches range from the direct study of ego defense mechanisms, relation between test anxiety and defense styles (Mohseni, mohhomaddi, javdan,2014) , prediction of mental health by Immature defense style(Dhakili, Manavipour, Golshali, 2013) to Gender differences in self report defense mechanism(Petraglia et.al, 2009, Drapeau et.al,2011). Although the use of defence mechanisms is associated with positive aspects of psychological variables, many of the studies support that the use of defences have association with some pathological variables (Irandoust, mozafari, Ghaderi ,Khaledian & Taghva , 2014).

The use of defense styles has been found that higher in some cross sectional groups (Parekh et. al, 2010). Petraglia, Thygesen, Serge Lecours, Drapeau, (2009) explored the relationship between gender and defenses using the Defense Style Questionnaire (DSQ-60) , but no significant differences were found in Overall Defensive Functioning . Sometimes the use of defences has been associated with mental health and sometimes with mental illness (Dakhili, Davood Manavipour & Golshani , 2013 and , Irandoust, mozafari, Ghaderi ,Khaledian&Taghva, 2014).

A null hypothesis was formed that " There is no difference between Male and Female, Urban and Rural and Undergraduate and Postgraduate students in their Use of Defense Styles". The participants of this study who were between the ages of 18-26, consisted of a total of 260 university and college students (130 males and130 females) drawn from post graduate and undergraduate departments in Mysore university and colleges, Mysore, India and " Defense styles Questionnaire (DSQ-40)" by Andrews, Singh, & Bond, (1993) were used.

In order to understand the differences in use if defense styles, the mean differences in the data of male and female respondents, Urban and Rural respondents as well as Undergraduate and Post-Graduate respondents were compared using Independent samples T-tests. The response rate of 61.90%. Their mean age was 21.05 years (SD=1.73) with 130 (50%) females and 130 (50%) males.

Results showed that Significance differences in the use of defense styles have shown in All three defense styles: Matured style, in which the score of Male (M=5.28, SD=1.21) and Female (M=5.67, SD=1.24) participants where; t (258) =-2.631, p =0.009, Neurotic Style, in which the score of Male (M=5.06, SD=1.24) and Female (M=5.72, SD=1.39) participants where; t (258) = -4.033, p =0.000, and Immature Style, in which the score of Male (M=4.94, SD=1.13) and Female (M=5.26, SD=0.99) participants where; t (258) = -2.466, p =0.014 showing there are significant mean differences between male and female in the use of all three defense styles. So, Male students and female students differ in their scores in all defense styles (Matured, Neurotic and Immature).

When the mean differences compared with respect to the living background of the university students, significant mean differences could not be seen in any of the defense style. Matured Defense Style, in which the score of Urban (M=5.46, SD=1.24) and Rural (M=5.48, SD=1.25) participants where; t (258) = -0.122, p =0.903, Neurotic Defense Style, which the score of Urban (M=5.26, SD=1.34) and Rural (M=5.54, SD=1.35) participants

where; t (258) = -1.916, p =0.056 and Immature Defense Style, in which the score of Urban (M=5.05, SD=0.10) and Rural (M=5.14, SD=1.14) participants where; t (258) = -0.672, p =0.502 show no difference in the DSQ scores when their living background are compared. It can be reported that Differences in terms of Living background cannot be seen in any defense style score.

Significant differences were shown in all three Defense Styles between UG and PG students. Matured Styles, in which the score of Undergraduate (M=5.71, SD=1.07) and Postgraduate (M=5.24, SD=1.35) participants where; t (258) = 3.064, p =0.002, Neurotic Style, in which the score of Undergraduate (M=5.62, SD=1.20) and Postgraduate (M=5.15, SD=1.46) participants where; t (258) = 2.823, p =0.005, and Immature Styles, in which the score of Undergraduate (M=5.40, SD=0.93) and Postgraduate (M=4.80, SD=1.13) participants where; t (258) = 4.636, p =0.000 show there are significant mean differences between UG and PG students in their scores in all three defense styles in DSQ-40. So it can be said that with respect to educational level (UG and PG), the students differ from one another group in each defense style.

The whole student sample who responded for this questionnaire was taken into the consideration and results showed that Significance differences between Male and Female students, in the use of defense styles have shown in all three defense styles being consistent with those of Diehl, Coyle, and Labouvie-Vief(1996) and Maltby and Day(1999) and again consistent with the findings of Plant, Hyde, Keltner, & Devine (2000). But this study's findings are contradictory with those of Petraglia, Thygesen, Lecours and Drapeau(2009) and with those of Parekh et.al (2010). Also the gender differences in the choice of defense style is consistent with the studies done by Petraglia, Thygesen, Lecours and Drapeau (2009).

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Leadership Style and its impact on Job Satisfaction level of Executive employees

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Abstract

This research is conducted in order to identify the variables impact the employee job satisfaction among the executives and managerial level employees of Private apparel company. Due to the changes in the modern technology and due to globalization, it has become easier for employees to switch between jobs and seek for better opportunities which make them satisfied. This has become a threat to many companies since employee retention has become difficult when there is low job satisfaction level among employees. Therefore, in current context companies are keener on improving job satisfaction level, since it can have direct impacts on the profitability and sustainability of the company. Due to this reason, there have been many numbers of researches have been conducted on this subject for various industries and companies. However, due to the lack of studies conducted specifically on the impact of employee job satisfaction and leadership styles in the apparel sector of Sri Lanka, the researcher has undertaken this study with the expectation of understanding the major variables which cause employee to be satisfied or dissatisfied with their job.

Author Keywords

leadership, leadership style, corporate culture, recognition for work, promotion, job satisfaction

Introduction

XYZ Holdings is one of the three biggest attire organizations in Sri Lanka, and contribute extraordinarily towards the nation's economy and enhancing work in the nation. More than 95000 individuals are utilized in the organization including both non-official and official levels. The center zone of this investigation is limited to the official level workers in XYZ Design Service which is in one of popular city in Sri Lanka. XYZ Holdings is a substantial creation organization which has worldwide customers around the globe. Be that as it may, regardless of whether an organization is item or administration situated, one of the key factors taking all things together time achievement and income age for an organization is employee work fulfillment. The nature of the items and the developments and present-day plans are altogether affected by the mentality of the representatives on their activity. The organization is additionally excited about giving a decent stage to the representatives to enhance their state of mind towards occupation, and the prosperity of workers is exceptionally engaged in the way of life of XYZ Holdings. Through the discoveries of past examines on various organizations and societies, it very well may be expected that having a decent authority style in an organization will affect the activity fulfillment levels of its representatives, and the other way around. The target of this examination is to distinguish the connection between the authority style and the activity fulfillment of a representative in the company. Recognizing the effect of management

style on occupation fulfillment can enormously enhance the human asset management, and the productivity and adequacy of the organization.

Experimental

In outlining the exploration, principle perspectives, for example, assurance of the populace, test measure, inspecting strategies, and so on should be finished. (Zikmund, 2013) The essential information accumulation will be done by means of a survey, which contains 23 questions, which was dispersed to the chosen test. Greater part of the polls messaged to the chose workforces, while for other people, printed surveys conveyed dependent on the comfort of gathering them. The sample size for a population of 240 with a confidence level of 95% was arrived at a minimum of 148. Therefore, sue to the ease of calculations when analyzing the variables; researcher has used a sample size of 150. The sample population was limited to executive level and for the managers. The optional information for the examination is primarily assembled from the already directed specialist on comparable themes, corporate site and records, organization yearly reports, articles composed on comparative subjects, leading meetings with applicable people, and so forth.

As per Sekaran (2003), data analysis is one of the most crucial steps in undertaking a research, because all the conclusions on the research will be based on the outcome of data analysis. Data analysis includes the collection of data, storing and processing the collected data, analyzing data, interpreting the results based on hypotheses testing and providing conclusions and suggestions. Based on the correlation matrix of current investigation, the association between the independent variables and the job satisfaction level of employees can be seen. The statistics shown that there is a moderately positive correlation with leadership style of supervisor and the promotions. A moderate positive relationship was seen between recognition of work and job satisfaction, where a small positive relationship was observed with corporate culture. All the study variables showed a positive relationship with the dependent variables, meaning that any positive impact on the independent variables will reflect positively in the job satisfaction level of the employees. Therefore, based on the correlation values, all null hypotheses were rejected. With the development of Technology, the business world has opened up and associated with whatever is left of the world. In this way, in spite of the geographic and social contrasts of the organizations in various districts and nations, the professional workplace of each other organization can be seen and are straightforward. With the change in the activity markets, it is simpler for workers to look for preferred open doors in the current over at no other time. Hence, work fulfillment has turned into a pivotal viewpoint in the accomplishment of organizations as at present. His has driven numerous organizations to re-strategize on the best way to enhance worker fulfillment and in this manner hold great representatives and enhance productivity of work. The focal point of this examination was to distinguish such qualities which may affect the activity fulfillment level of XYZ Intimates, and it very well may be expressed that the discoveries of this exploration are profitable for the organization in re-strategizing the administration styles. It is normal that, by actualizing on the proposals given by the analyst, XYZ Intimates will have the capacity to enhance initiative styles of the directors and officials and even the potential pioneers of the organization, and enhance worker work fulfillment.

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The impact of Job Satisfaction on employee retention in private Banking Industry (Case of XYZ Bank)

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Abstract

The main objective of this research assigned to me is to identify the impact of employee satisfaction on employee retention in Private Bank. A bank is a place for managing the public debt, issuing legal tender notes and having the government for chief customer. Since this is a commercial establishment handles money transactions with customers the employee's satisfaction should be hundred percent accurate and efficient. Having done a close analysis on employee satisfaction favorable conditions within the bank is essential for bank employees to gain confidence in the work they do and guided experience is very vital in the banking sector in order to maintain efficient and capable workers when dealing with cash and customers.

Author Keywords

Employee, satisfaction, Retention, Bank

Introduction

Commenting on the employee gratification in the Bank fringe and non- fringe benefits as this would be an influencing factor in changing the behavior and or attitudes of an employee and diverting them towards organizational goal achievement. Where ever and when- ever workers job satisfaction is fulfilled and maintained without any draw backs and shortcomings, the retention of workers will be no question to the management and the turn out will also be elevated and smooth functioning will be assured to such work places. Since money is handled during the entire working hours of employees the returns they get monthly for their dedicated work should definitely be upgraded and not work just for peanuts. Demographic data such as age, gender, No. of children, marital status have been analyzed in the research study through collected data. Working hours should be flexible and the working environment should be comfortable. The co-worker's relationships should be trust worthy, reliable and working friendly. The attitudes of the top ranks to their subordinates should be flexible and understanding. The chances for workers ideas, opportunities for personal development, salary levels, A stream lined promotion scheme is necessary when considering qualification and experience without any prejudice. The outcome of this research stands that where ever these requirements are fulfilled the employee's efficiency rise to peak heights and the customers satisfaction is also maintained into supremacy.

Experimental

In each analysis methodology is significant because its shows the systematic path to direct the analysis downside once analyzing the matter and additionally finding the acceptable solutions to resolve the matter (Jessie Trucker, Sheila R.Adams,2001). The sensible problems may be critically proven by the methodology designed within the treatise Colin Dey,(2002).The study sample, Graphs, measurements, tools, knowledge

analysis and findings give through the methodology to administer an overview to the analysis.(Bharati Mohapatra – 2016).This analysis is essentially designed to a specific scientific structure that every and each statement might prove with proof. A search is finished to search out solutions to a sensible, theoretical issue within the society and this could be clearly correct once analyzing the study downside. During this analysis the scientists focuses on the analysis drawback from the respondents' purpose of read. As we all tend to understand banks play a serious role in any country by maintaining money stability and causative to the Gross Domestic Product. Banks are referred to as the money backbone of any country. At this juncture we tend to focus principally the analyzing ways and this inquiry may be seen in 3main sorts. They are qualitative, quantitative and mixed strategy. Out of those 3 sorts the author used the quantitative technique to style the model so as to supply a selected direction to the study drawback. Since the qualitative analysis technique holds some weaknesses reminiscent of the method of your time overwhelming. Some issues might go unobserved (Bowen – 2006), and conjointly the analyzers notice it tough to analyze relation between totally different research phenomena (Barbour-2000). Once it involves knowledge assortment study can essentially accept the collaboration of 75-100 respondent party that contains staff at XYZ Bank. Establishing the strategy of investigation this treatise can use deductive approach to clarify the connection between job satisfaction and worker retention. The philosophy on that, the analysis would be based mostly is positivism. William James indicated that the "Philosophy is a curiosity stubborn plan to assume clearly". In different terms philosophy refers to a particular quite thinking, a particular quite approach to a particular quite a retardant.

Banks are aforesaid to be one in all most all the organizations that give job opportunities that are packed with difficult and a lot of difficult. as to remain productively bank ought to organize the background for workers glad so as to create the purchase glad reciprocally. The construct and strategies that have already engineered up may well the background of this analysis drawback and can be benefited to support the aforesaid theories with proof. These 2 factors are reciprocity interconnected to every different aspect. Moreover, this study is utilized in the methodology introduced by Saunders (2007) and follow the speculation of form to assemble knowledge. In view of the present investigation discoveries that the researcher found that, the majority of the XYZ Bank workers are not happy with their occupations, and representatives trust that the organization does not have trust on them. Moreover, the representatives believe that the best level administrators are not esteeming their thoughts and don't allow to be inventive. 44 % of representatives work under distressing circumstances and 54.667% work under direct upsetting circumstance. As indicated by the workers' conclusion on their activity fulfillment is the most essential information which clarify the whole representatives' thought with respect to the XYZ bank. 94.667% surmise that they are not happy with the employments. 4% of the representative unbiased thought regarding the activity fulfillment, Just 1.33% of respondent. 94.667% of the workers not happy with their occupations. It is an extremely basic circumstance and it implies that organization doesn't play out its most extreme level.62.66% of the representatives trust they have a bearer way in the XYZ bank, and the reason that call attention to is XYZ bank is another bank and small bank in the keeping money industry, however XYZ mark altruism in the general public and monetary help from the XYZ Holding open up to the colossal potential circumstance. As recommendation disciplinary horizon must be extended so as to avoid the traps of

biased partial correlations, particularly as a result of variables within the psychological dimension could also be omitted, and since new equal beneficial links might arise. Extending the horizon clearly makes the image supplementary complicated, however it should additionally offer suggestions on a way to handle the foremost serious issues. Banks ought to introduce special schemes involving to pension, gratuity, retirement, and different connected advantages to boost the employee's sense of security. Special attention should to incline towards reducing operating hours and frequent transfer of the staff. Employee's performance ought to be appraised from time to time so organization will come back to grasps regarding the potency of the organization.

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A Genetic Algorithm to Generate Optimum School Timetable for Sri Lankan Government Schools

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Abstract

The timetabling problem is an extremely difficult task which is faced by Sri Lankan Government schools in the beginning every year. This is due to the complexity of the problem and the large size of the searching space of the possible solutions. Though there are various scheduling techniques which can be used on scheduling timetables, genetic algorithm has more benefits over the complex problem space such as robustness, achieving global optima in an unknown solution domain. Since the school timetable problem also has unknown domain of solutions, this paper proposed method, using the genetic algorithm, for generating effective and efficient timetables for government schools.

Author Keywords
Genetic Algorithm, School Timetable, NP-hard

Introduction
Generating timetables of government schools in Sri Lanka is one of the arduous task because of its problem complexity and the huge searching space of possible solutions. This becomes even worse with various criteria such as the size of the school, culture and other constrains which enhance the complexity and searching space drastically. Although a fair progress in the development of algorithms could be observed in the last couple of years, generating timetables for Sri Lankan government schools is still known to be a challenging task and require more human/hours because of the lack of algorithms matching to the situation and the need. This inspires the reason for need of perfect algorithm which is possible in handling large searching space and finding the perfect solution with a few milliseconds. Genetic algorithm shows many advantages over other searching algorithms such as ability to find optimized solution in an unknown domain and reaching of a global optimum fast. The timetable problem is NP-hard and usually suffering severely with the complexity and the unknown searching domain which creates difficulty in achieving global optima. Genetic algorithm shows good potential in handling these type of searching and achieving global optimum fast.

In this research, we investigate the optimization of timetable generation process for Sri Lankan government schools using genetic algorithm technique. We studied the influence of various input data and constraints for chromosomes as well as the initial population required to generate the final structure. The initial population was generated randomly so that it includes all possible combinations of input data and constraints. We have obtained an eligible population of parent chromosomes through the selection process using a well optimized fitness function defined with identified constrained. Then the new descendent population of chromosomes have been obtained from the selected parent population using the single point crossover between two parent chromosomes. The

crossover point was chosen randomly from any point on the string of genes in order to achieve successful descendent with higher fitness. Mutation has been used in the new generation to improve diversity in the new population of chromosomes and to achieve more accurate global optima fast. With the accurate crossover and mutation values, a successful timetable was able to generate finally.

Experimental

The test was performed with the samples timetable data collected from Zahira College located in Mawanella, Sri Lanka. The sample data was related to the secondary section (from grade 6 to 13) of the school which contained 93 teachers, 62 classes, 33 subjects over 79 class rooms with different time slots per day. An initial size of 400 chromosomes has been generated randomly as the initial population for testing. Fitness function has been generated with various identified constraints to select chromosomes for fitness. Selection of parents for crossover has been selected using tournament method. Single point crossover technique using random points has been used with the rate of 0.5 - 1.0 crossover rate been used. A reduced mutation rate of 0.001 – 0.1 mutation has been used to perform the experiment with the selected population. Experiment was performed using different crossover rate values (selected from between 0.5 and 1.0) and the mutation rate (between 0.001 - 0.1) identify the best values for each respectively which generates the best fitness solution. The crossover rate of 0.7 and mutation rate of 0.003 was used during the experiments regularly to achieve best results since those rates are producing more successive results during the experiment time.

The effectiveness of the generated timetable was evaluated with the accuracy, which was evaluated using the fitness function, and the efficiency. To determine the variation in achieving global optima, experiment was conducted for various output sizes. In order to avoid narrowing of global optimum, fixed crossover rate and mutation rate were used during the experiment time. The algorithm was performed well in the situations where the number of outputs are less due to the achievement of highest fitness. As the size of the output increases, time taken to achieve global optima is increasing since algorithm needs to run more generations to achieve the global optimum.

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Health care system for University Student in Sri Lanka to minimize dehydration, alcohol and drug abuse

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Abstract

Water constitutes a greater amount (about 60%) of the human body and plays a major role in nearly all aspects of human being as well as disease prevention and health promotion. Dehydration has a wide range of negative effects on human Health especially among school/ college students. Such as short term memory, effects on gastrointestinal, kidney, and heart function etc. And, another major problem have become drugs and alcohol abuse. The high rates of drug abuse among college students can be attributed to a number of factors such as: stress, course load, curiosity, peers pressure etc. This system will suggest some techniques and mechanisms to overcome above difficulties. Sensor of this system can monitor a person's skin hydration to detect dehydration before it poses a health problem as well as this system will detect drugs and alcohol use. Especially this system will develop for students to detect their abus and improve health and get more advantage.

Author Keywords

Dehydration, alcohol and drugs abuse, Microproceser, LED, Biosensor

Introduction

Nearly 75% of the human body has water. Without enough of water, our bodies cannot function properly. Throughout the day, we breathe, sweating, urinating and defecate, A significant amount of water is constantly lost, but we can replenish the water in our body by drinking fluids. Normally our thirst mechanism tells us when we need to increase fluid intake. Dehydration occurs when we use or lose more fluid than we take in, and our body doesn't have enough water and other fluids to carry out its normal functions. If we don't replace lost fluids, we will get dehydrated. The prevalence of not enough water intakes has improved substantially among University students. Its association with dehydration which has been associated with several adverse health outcomes including poor academic performance. Now it is a major public health concern. There are some people in our society who use alcohol and drugs abuse. This is a major problem and can have serious consequences especially among college students between the ages of 15 to 24. Some teenagers regularly use drugs or alcohol to balance for anxiety, depression, or a lack of positive social skills. Drops in school performance, deterioration in family relationships are some of the signs of teenage drug or alcohol abuse, and 50% of deaths involve alcohol or drug abuse. This system will propose some techniques, and a mechanism to conquer above difficulties. Using tiny microprocessor this system detects voltage of the skin-load. Threshold logic determines if the hydration has dropped significantly enough for the user to be considered dehydrated. Finaly throug LED it will indicate. Using biosensor this system continuously measure electrodermal activity (EDA), skin temperature, and acceleration. Wearable biosensors will provide valuable objective data regarding the timing and contexts of drug use. And also this system will

receive the electrical signals transmitted by the chip, which are recorded and translated into alcohol readings. Two additional sensors on the chip measure background signals and pH levels.

Methodology
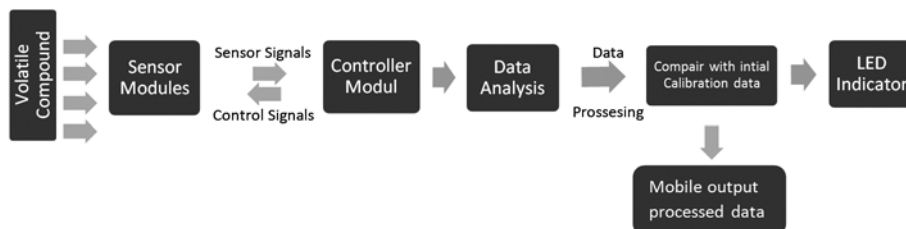
We use Total body water, TBW to determine hydration status. This system will emulate this function. In order to get done the work followings have to be follow up
- The Atmel ATTiny85 Microcontroller is a high-performance,
- Low-power Atmel 8-bit AVR RISC-based microcontroller,
- An integrated circuit (IC), for sine wave generation.

Dehydration system of this project is going to implement by basically,
- The calibration data is stored in the microprocessor based on the system's start up and/or reset.
- The load resistor is set to 3kΩ.
- The output voltage of the skin-load divider is read by the ATtiny85 itself with the onboard 10-bit analog to digital converter.
- The AC signal is generated and a running average algorithm detects the wave peaks to find out magnitude of the output response.

Threshold logic determines if the hydration has dropped considerably enough for the user to be considered dehydrated. To get sensors signal there are copper strip contacts used to interface the electronics with the skin.

Normally, an additional 0.1% of the ethanol consumed is transported to the surface of the skin where it exits the body through sweat. In alcohol detection of this project,
- Across the two coplanar, AC voltage applied electrodes and the impedance across the sensor electrodes was measured and calibrated for physiologically relevant doses of EtG in human sweat.
- EtG detection over a dose concentration of 0.001–100 µg/L was demonstrated on both glass and polyimide substrates.
- Detection sensitivity was lower at 1 µg/L with gold electrodes as compared to ZnO, which had detection sensitivity of 0.001 µg/L.
- Based on the detection range the wearable sensor has the ability to detect alcohol consumption

In this system Drug detection process, going to use wearable ECG-based sensing (Zephyr BioHarness 3) to detect cocaine. According to knowledge based and data-driven detection frameworks, have to evaluation of ECG feature sets.

- Raw ECG measurements are transmitted wirelessly to a smartphone and also downloaded directly to a server to provide redundancy.
- Noisy ECG waveforms collected using a wearable ECG sensor.
- Classified above waveforms with comparing stored records.

Recommended Solution

The following figure describes the solutions. A wearable device with a sensors and mobile processed output.

In the future will able to enhance this system further more to detect more drugs and Application to view all the stored dehydration, drug and alchohol collected records.
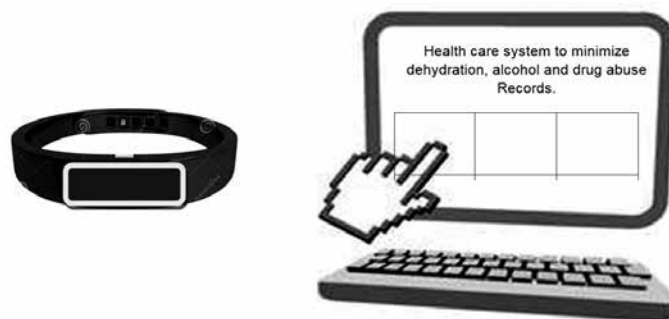
Experimental

Comparison of TBW calculated with using predicted and experimentally determined skin impedance values Test was done with six members.

	Predicted		Experimental	
	Hydrated	Dehydrated	Hydrated	Dehydrated
1 (Male)	52.48	45.67	50.47	48.50
2 (Male)	50.65	48.55	51.65	49.33
3 (Male)	48.35	42.67	50.23	45.54
4 (Female)	48.65	50.12	48.77	49.56
5 (Female)	50.40	48.45	46.44	50.45
6 (Female)	47.50	50.34	48.12	46.87

	Before Prediction	Experimental
1 (Male)	50.12	49.56
2 (Male)	45.67	49.33
3 (Male)	48.35	48.50
4 (Male)	51.65	48.77

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Efficiency of a Web Application in Eliminating Middle Brokers while Buying and Selling Crops for Sri Lankan Farmers

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Abstract

Farmers are known as our backbone and the entire world depends on agriculture, because when there is no agriculture there is no food and harvesting, therefore the farmers are not only the backbone but also they are a very important category of the society, Unfortunately the majority of the farmers are lacking education, and specially in harvesting and has failed to gain information on new techniques and continue to use the same old technologies resulting in poor harvest, as far as a farmer is concerned their main income source is to sell the crops they harvest, if they are unable to do so they might seek help from government most of the time, this does not work very well for everyone, not only this when the crops are harvested they face another major problem that is finding a better price for their harvest. A new third party involves here called the middle brokers or mediators, they take most of the earnings of farmers and well as from buyers, leaving farmers with less income or profit and buyers pay a high price for their goods. This web application helps farmers individually to grow further and it helps to get valid and up to date information on agriculture, such as latest farming technologies, crop types, soil conditions for crops, fertilizers, weedicides and pesticides recommendations, available buyers, what crops have more demands and how much. Thus farmers can avoid the mediators and find better selling options in Sri Lanka.

Author Keywords

PHP, MySQL, MariaDB, Apache, FileZilla, FTP, Atom.io, File Upload, Moris.js, SESSION, REQUEST, POST, GET

Introduction

Advancements in Internet and related technologies have opened new possibilities of accomplishing tasks in more effective ways, out of them one being Web Applications, One of the major barriers faced by Sri Lankan farmers is that finding the right market and prices for their crops after harvesting, this is due to several factors, mainly the literacy level of farmers are very poor, poor knowledge on latest methodologies of Agriculture, use of old crop cultivation methods, lack access to latest crop cultivation information, having a poor understanding of the real market demands, and sometime unexpected and unsupportive weather, and middle brokers involvement in purchasing the harvest for a very cheap price therefore and buyers need to buy the crops at a unreasonable high prices,

Therefore with the intension of eliminating or minimizing these issues, a web application is proposed with providing proper crop cultivation information, real market demands, and for buyers to communicate with farmers to get real predicted harvest quantities at required time periods for reasonable rates.

Website URL : http://www.goviganaseva.com

Methodology
The waterfall method is used as the development method for the proposed web application system. Since it's easy to understand and each stage is very clear and each stage has a precise outcome. Figure 1 shows the overview of the waterfall method.
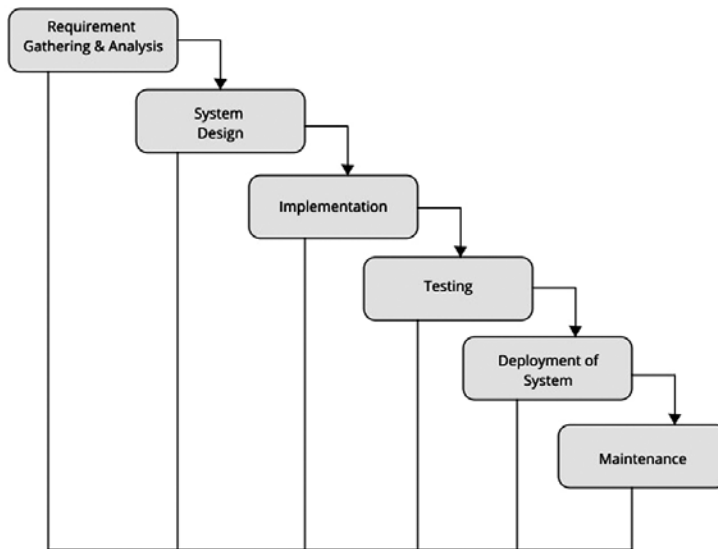
Figure 1 - Overview of Model Used

Available Modules of the Web Application
• Administrator Module
• Farmer Module
• Buyer Module
• Visitor/ Web Browser Module

Administrator Module
Crop Information can be managed, this involving registering new crops, updating existing crops, and deleting crops; Farmers and Buyers information can be viewed and approved and accounts can be deactivated, request for new crops to be added to the website can be viewed, messages from farmers and buyers can be viewed, crop demands can be area wise checked, contracts of buyers and farmers can be viewed, new admins logins can be created, password can be reset.

Farmer Module
Crop Information and recommendations can be viewed, view demands for particular crop, a crop can be added which is cultivated by the farmer, new crop can be requested, further help can be sought, contracts can be viewed, and password can be reset.

Buyer Module
Crop information and recommendations can be viewed, crop supplies can be seen, crop demands can be added, contract requests can be sent (buy), requirements can be posted, and password can be reset.

Experimental
A survey had been conducted among selected number of farmers and buyers, who are mainly vegetable sellers, at the Saturday vegetable fair, and small vegetable shop owners, summarized results shows that majority them like the idea and appreciated, only burden was to help them use the website and browse along and see for them self which they found bit difficult to do, the main reason behind this was the computer literacy among the selected group. The middle broker elimination part and direct communication between farmers and buyers were well appreciated,

Conclusion
As per the survey results it Is very clear that introduction of such a website will greatly help the farmers community as well as buyers, and can easily avoid the middle brokers, as well as farmers can know the demand for certain crops even before they cultivate them. And the proposed web application need to be in local languages Sinhala and Tamil.

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Expert System to Search Family Relationships Through a family tree

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Abstract

Artificial Intelligence is the simulation of human intelligence processes by machines, especially computer systems. Particular applications of AI include expert systems, speech recognition and machine vision. Today, modern dictionary definitions focus on AI being a sub-field of computer science and how machines can imitate human intelligence. This paper about study an expert system of finding different relationships among the family tree. Nowadays due to the advancement of technologies and current human poor relationship, the teenagers and young children has forgotten their families and how they should address them. Therefore, a system has been implemented which gives assures the correct relationship after getting inputs from user for set of questions provided by the system. In order to evaluate the efficiency of the system, the implemented system was demonstrated to 100 students of BCAS Kandy Campus from both IT and non-IT students including male and female age between 18-25 and above to check the validity of the system. Based on survey evaluation results, it shows that 93% of students who found the system is very effective and efficient way to check the relationships among the family tree comparing with usual manual way without a system, and also by using this system it provides or prevents wrong affairs among their relatives specially marriage proposals. The main aim of this research work was to find relationships through a knowledge-based system with the technology of artificial intelligence.

Author keywords
Artificial intelligence, machine vision, Prologue

Introduction
With the massive development of Information technology, Artificial intelligence has opened a door for every IT related industry to implement technologies and systems related to Artificial Intelligence instead of human power. This implemented system is, one that gives a solution to find relationships within a family. This concept was taken as a prototype idea but using this concept of searching techniques and idea, in future can be implemented for complex problems with number of family generations. Especially this system mainly targeted on teenagers and youngsters. When a situation of finding marriage proposals arrives, this system will help to find out the relationships among the two members, because sometimes this can lead to be far term sisters and brothers. And also, this system will help the teenagers and the youngsters to be in touch with the family relationships and address them according to their respective relationship name.

Even though there are other methodologies to solve this problem, still there is very huge demand and opportunities to solve these types of problems by using the technology of knowledge-based systems or expert systems.

Methodology

The main software tool used for this system is prologue. First the system was made with a sample family relationship and later it was converted to a common family relationship system where anyone can be able to find the relationship among their family memebers. From each user, a set of questions is being asked by the system and from the user input the system showed the relationship between the user and their family member. Here breadth-first method of searching is used, because here the time or the cost is not measured or considered but reaching the final goal and giving the final conclusion for the user is important. In order to validate the system a survey was conducted among BCAS students by demonstrating the above system.

Experimental

The experimental phase took place after the system was implemented fully and by demonstrating the system a survey was conducted between number of various field students to have more classification and evidence of the above research. The survey was conducted to assure the efficiency of the system, a targeted group of students at BCAS Kandy Campus was taken including from all categories like IT field and non-IT field. There were a mix of male and female students and age gap 16-18, 19-21, 22-24 and above 24. The main motive of this survey was to target non-It students because feedbacks given from them would be more validate and efficient for this research. Therefore 60% of them were non-IT and 40% of them were IT students. Following graphs shows the survey results among IT students. It clearly shows that 87.5% says that this system is 50%-75% or 75%-100% accuracy.

Survey from IT students
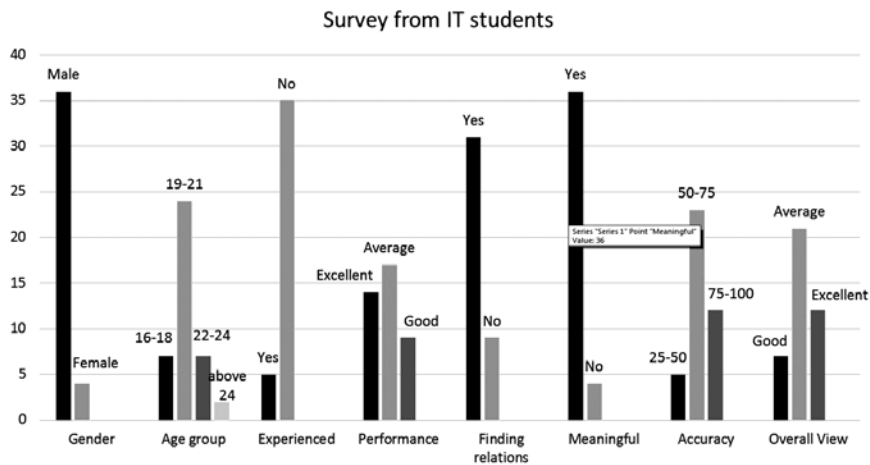
The same survey has been conducted with the non-IT students. Following survey results shows the statistics derived from the non-IT students. It clearly shows that 96.6% says that this system is 50%-75% or 75%-100% accuracy.

Survey from non-IT students
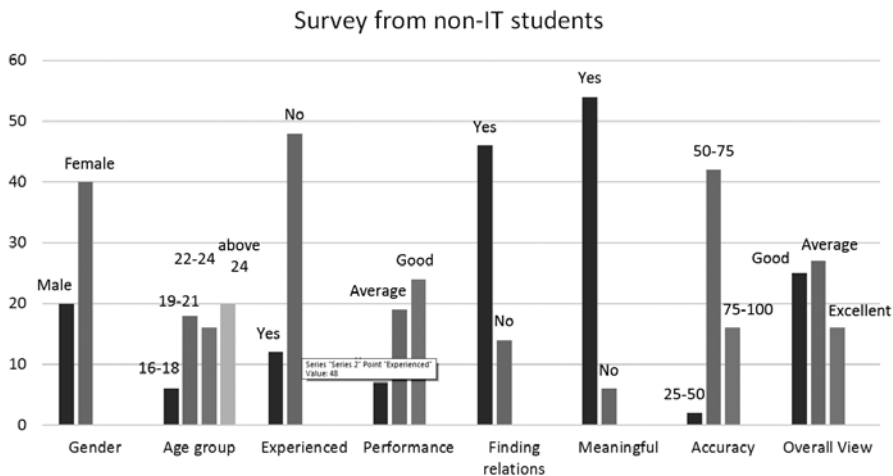
Conclusion

From the above survey conducted from the bunch of 100 students, it was evident that this system was much efficient in finding the relationships among the family members. Overall survey summary clear shows that 93 out of 100 students says the system is 50%-75% or 75%-100% accuracy, which conclude 93% of them are says the system is effective and accuracy.

About 93% of students had given positive comments about the system, which was taken from the above conducted survey. The majority of students from both IT and non-IT says that the above system produces accurate information and they also say that the performance of the system is average which means the system has reached its basic level of satisfying user's requirements.

Later this system can be developed more into an advance system to say all the relationships among many generations which will be more effective and efficient. Also, from the survey it is evident that about 80% from students have not experienced with such a system, or a concept which means that this concept and research is a very new emerging theology and concept put forward.

Harvard Referencing

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Expert system to give warnings and precautions on the impact of social media usage

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Abstract

Social media is a popular method for communication amongst the people all over the world. But however excessive social media usage can raise questions about whether academic performance is affected. So as to explore this question, a survey was conducted on the students of HND IT Department of the BCAS Kandy Campus in regard to social media usage and their academic performance. In order to evaluate the results, the survey was conducted from both male and female of 100 students. to check the validity of the survey results same students' academic performances as a parameter assignment submission rate, cross checked from department of IT for same batches students, it shows that their academic performances were very poor, it conclude that if a student spend more time with social media it effects the performance of their studies, further the according to the results of the survey, an Expert system was made for the new comers to provide the impact on the social media usage and provide warnings and precautions to minimize the social media usage or completely stop them if they are above the average level. The system also explored which age group is mostly impacted by the social media usage. The findings of the survey and the expert system can be used to propose the effective plans for improving the academic performance of the students in such a way that a balance in the leisure, social media usage and academic performance can be maintained without any extreme usage of the social media.

Author Keywords
Social Media, Expert System, prologue

Introduction
In artificial intelligence, an expert system is a computer system that emulates the decision making ability of a human expert. A well-designed expert system emulate the reasoning processes used by experts to solve problems, and are popularly used in medicine, business management, and design and searching for natural resources. The use of social media plays a variety of roles in education as well which includes providing a media to share ideas as well as allowing students to build their own communication to collaborate with each other, facilitate the art of learning. But one of the most well-known issue in the current world is also the impact of the social media among teenagers' lives and children which could ruin their lives as well as have a bad impact on their education. Social media diverts the attention and concentration of students towards activities which are not educational and time wasting such as chatting on non-educational topics.

Methodology
The implementation of an Expert system was mainly focused on finding out the social media impact for the new comers with their course and provide them a precautions or warnings in order to minimizing the usage or completely stop. To building this Expert

System, the survey was conducted from four batches of HND IT department of 100 students, by including following parameters.
• The number of social medias used
• The average number of hours spent per day
• Reasons for using social medias
• Age group

After the summarization of survey results, to check the effect and validity of the survey results, same students' academic performances were cross checked from the department of IT, Then from the analysis of the survey result a set of question answering Expert system was built. With similar set of questions provided during the survey. Where the new comers who join the course have to answer to those set of questions to the system. As per the user input the system provides a precaution or warning to the new comers.

Experimental
The data retrieved for the survey was from 100 students of four batches including males and females. The students' responses were evaluated against the above mentioned parameter. The following survey results shows that those batch who use social medias more than 5Hrs per day their assignment submission rate was less than 75% .since for this experimental purpose 75% of assignment submission rate was taken has a bench mark of each student.

Survey Summary chart showing Social Media Usage per day >5Hrs and Assignment submission rate>75% for Batch1, Batch2, Batch3, Batch4
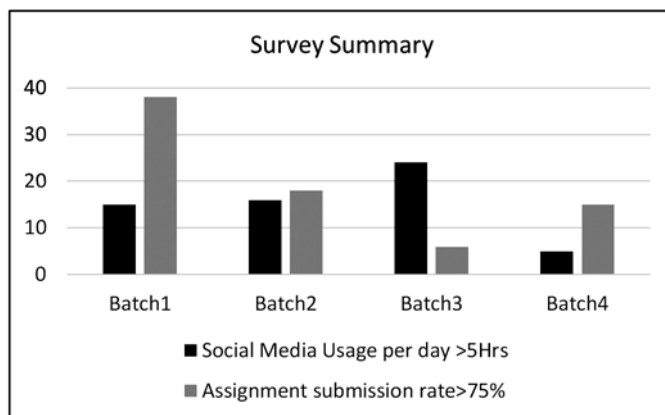
The survey resulted that each batch had different levels of social media usage according to the number of students in that batch. After the survey was taken, same students' assignment submission rate were cross checked from the department of IT, it showed that students with high social media usage had poor assignment submission. An expert system was developed for the new comers for the college to give warnings and precautions to reduce their social media usage if it is more than 5Hrs per day, and motivate them to engage more on their studies.

Conclusion

As per the results shown, it can be concluded that the increase in the usage of social medias decreases the academic performance of the students. Most of the students from the above batches are excessively using the social media therefore, concentration on academic aspects has gone down severely. There were few exceptional cases of students who averagely uses social media which had less negative effect on their academic performance.

The age group between 17-21 are the bunch of students who spend most of their time in social media rather than concentrating more their studies. Most of the HND IT students' age is falling between the categories of age 17-21, so that has been proved if they use the social media excessively(>5Hrs per day) it definitely impact on their studies.

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Effectiveness of Migrating to Open Source Based Operating System from proprietary Operating System

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Abstract

The Research is focused on the effectiveness of migrating to Open Source Operating System from Proprietary operating system. These are the 2 Operating System widely used these days and discussed as most of the operating system topics. Open Source such as Linux, and the other one based on Microsoft Windows Operating System but Currently Microsoft Windows has been used by most of the users in many organization which cost them fortune. Both Operating system have their own pros and cons, Different versions, Functions, Features and user friendliness. And also this paper discussed how Microsoft Windows and Linux based Operating System differ in Cost, Security, Reliability, Privacy, Customization and Variety of Distributions. This will help users to decide whether migrating to Linux with an Alternative software for which is been used in Microsoft Windows such as MS office, 3D Max any other databases (Matt , 2011). This has been discussed, analyzed about advantages and Disadvantages (Das, 2017), research has been carried out and some surveys among staffs and students in an Institution.

This paper also have a short case study whether is it possible to migrate from Windows Operating system to Linux operating which will help the institution to reduce the cost of license software and current operating system by implementing an Open Source (Linux) Based Operating System to fulfill their day to day work. This can be applied not only in the institutions it can be used in most of the industries.

Author Keywords

Linux Kernel, Open Source Software, Operating System, technology platforms. Windows Operating System.

Introduction

In this 20th Century Computers and smartphones technology has taken the highest place and grown rapidly. Computers and smartphones has their own pros and cons. Smartphone is considered as a mini computer where only limited amount of activity can be carried out. To operate the computer, User need an Operating system to interact with computer's hardware. There are few Operating system out there in the market, but this research is mainly forced on a proprietary and open source Operating system they are Microsoft Windows and Linux based Operating System. Windows OS is the most widely used OS up to date. Windows has different versions of OS and it is the most user-friendly OS, but Windows is known to be a Closed Source OS and Linux is an Open Source, since most of us aware of windows family. This is mostly focused on Linux, it is an Open Source OS, and Developer can modify the Source Code and release their own version of Linux.

Currently there are hundreds of Linux Version has been released for home and office use. Most of the multibillion dollar company using Linux kernel to protect their Network.

Linux is the more Secure OS and has improved its Graphical User Interface and light weight OS.

The various operating systems that use the Linux kernel (Distro)
• Ubuntu
• Debian
• Redhat
• Fedora
• Chrome os
• Android

Linux Kernel used in others places
• ATM
• NASA
• Amazon
• Facebook
• Google
• Animated movies
• Cars

With all this information an experiment has done whether migrating from Windows to Linux is possible or not.

Experiment
Most of us very familiar with Microsoft Operating System. Then why migrate to another OS which we are not familiar with. Well there are lots of benefits in Migrating to Linux.

Windows	Linux
Cannot Modify	Open Source
Cost $150 - $300	Free
Paid Software	Free Software
No	Live Boot
Insecure	Secure
Virus, Malware	Less
High Hardware Cost	Low hardware Cost
Not Customizable	Customizable and Features

(Table 1 – Windows vs Linux)

For Migrating Purpose an institution environment has been used to see whether it is possible to migrate from Windows to Linux, Where the whole institution using Windows OS. This institution has more than 150 Computer running Windows OS including the Staffs and students. A Survey has been carried among the staff and the student about the day to day activity they are used to do in windows Operating System including all lab computers. According to the Department Wise and Alternative of Linux Software has been suggested.

Academic Staff, Administration Department and Classrooms

No of PCs	Applications	Cost each	Linux
30	Windows 10 OS	$199	Linux Ubuntu 18.04
30	Microsoft Office	$120	LibreOffice
30	Internet Browser	-	Chrome
3	Student Management Software	-	Student Management Software
5	Photoshop	$150	GIMP
5	Sql Server	$931	Compatible
4	Packet Tracer	-	Compatible
4	Visual Basic	$499	Compatible

(Table 2 – Alternative Software)

As per the above given table 30 Computers with most of the common software which is being used by staff, Administration and Classroom's has an alternative software in Linux.

Windows   - $199 x 30 = $5,970
MS Office - $120 x 30 = $3,600
Photoshop - $150x 05 = $750

Total of $10,320 x Rs 165 = Rs 1,702,800

By migrating to Linux will not only save money. It gives high security protection and high performance, it will be able to run common Linux OS distro in any low performance computer as well.

Conclusion

Windows and Linux as its own pros and Cons. Migrating from windows to Linux as shown in the table with the commonly used Software it will save lots of money to the organization, it will speed up the computers performance and give high security protection, but when it comes to the lab computers Linux could not be used because most of the software which has been installed are available only to windows Operating System. It is very clear that Migrating to Linux is possible in Number of computer in the origination. It depends on the software user use as daily basis.

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Comparative security analysis for various smartphone Operating System

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Abstract

From the past years onwards the usage of mobile devices, mobile technology is increasing at a higher speed. The OS does multiple works on mobile devices. IOS, Android, Windows phone and Blackberry which are recognized as most popular smartphone operating systems. The smartphone has become our personal computer with the addition of important features and in the same way it has become easier for the security risks by less secure system.

Currently, there are plenty of vulnerabilities in smartphones. Smartphone operating systems are offering several types of security features to prevent the smartphones from the vulnerabilities. Therefore, the findings of this study produce a comparative analysis of security in different smartphone operating systems and shows the most secure operating system by comparing the four most popular smartphone OS; Android, IOS, Blackberry and Windows Phones.

Author Keywords

Smartphone, Operating System, vulnerable, Security, Android, iOS, Blackberry, Windows Phone

Introduction

The use of smartphones has increased significantly in recent years. Smartphone provides large range of services to users so they face challenges such as security and privacy. Since most smartphone operations are carried out on the Internet and it may contain important data such as bank details, passwords, e-mails, photos, music, videos, etc. therefore, it is necessary to ensure security and safety of data. For smartphone authentication, user can use a pattern such as password, password code, PIN password and face unlock. But these authentication methods are not secured in a high proportion because with the brute forcing and guessing such measures could be penetrated. Basically, many malicious programs, viruses and Trojans have been developed according to the smartphone APIs (application program interface) and many of them are seen as secure software. Some reliable applications collect user information without the user's knowledge. There are many smartphone OS available, such as Android, iOS, Windows Phones and Blackberry. The configuration of each operating system is different. Different operating systems have different mechanisms to protect smartphones. This study produces a comparative analysis of security in different smartphone OS and shows the most secure OS by comparing the four most popular smartphones OS; Android, IOS, Blackberry and Windows Phones.

Experimental

In order to carry out the objective, several research papers were studied related to mobile operating system security. Data was collected from previous Internet research papers

and Internet Articles. With respect to collected data, analysis was performed to examine the most secure OS in smartphone by comparing security of various smartphone OS. Android, IOS, Blackberry and Windows Phones which are the smart phone OS used to make comparison. In order to carry out the objective, first data was collected about security features and vulnerabilities available in various smartphone OS. Then, analysis was made by comparing the collected data and finalized the most secure smartphone OS. According to the data gathered, Android has been considered the most popular among users around the world and it has more security threats than any other OS. According to a report from (Kelly, 2014)[5], 97% of Mobile Malware is on Android. Apple's iOS has a strong reputation for security and which is tightly controlled by Apple itself. BlackBerry has the strongest reputation for security, especially with the integration of secure containers from Good Technology. Blackberry also tightly controls devices and apps. Windows Phone also has some degree of centralized control, but it has a history of security weaknesses, even if its performance is improving.

Table 01 shows the comparison between the security features of the Smartphone operating system.

Smartphone OS	Apple iOS	Google Android	RIM Black Berry	Microsoft Windows Phone
Access Control Option	PIN, Passcode, Face Lock, Finger Print sensor	PIN, Passcode, swipe, Face Lock, Finger Print sensor	PIN, Smartcard	PIN, Smartcard
PIN/Passcode length, complexity, retry policies	YES	YES	YES	YES
File System Encryption	iPhone 3GS and up	Selected phone	ALL Black Berry phone	Windows mobile 6.5, Windows phone 8
SD card Encryption	NO SD card slot	OEM Proprietary	YES	NO
Data Backup Option	iCloud	Google Drive or Google+	BlackBerry Link	Microsoft OneDrive
Anti-theft option	Find my iPhone	Android Device Manager	BlackBerry Protect	My Windows Phone.
App Store Provenance	High	Low	High	Medium

Table 01

Conclusion

This paper provides a comparative analysis on security of Android, Blackberry, iOS and Windows Phone operating systems and through this analysis researcher concluded that there is no any operating system is secure. Every smartphone option has strengths and mobile security limits. The way user uses their smartphone and how comfortable they are when adapting their security settings will be crucial to decide which OS is best for user.

Each smartphone OS has its own characteristics. Being open source with the highest degree of customization, it has extended the use of the Android. At the same time, it has more security threats than any other OS. Apple's iOS offers few options for customization. Therefore, initiating updates or addressing security issues is relatively simple. iOS and Blackberry provide better services than Android or Windows Phone. According to several security experts, Windows Phone has obviously always been the last option or an enterprise usage in terms of mobile security.

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Factors Influencing Cloud Computing Adoption in Higher Education System: An empirical study based on the Universities and Higher Educational Institutes in Sri Lanka

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Abstract

In this new era, Technologies have been spread all over the world. Cloud computing is the one among the spreading high-tech technology. The beauty of the cloud is that the servers are off premises. It is growing popularity in the IT industry and Business organizations. Sensitive information of different entities is normally stored in remote services and locations. It provides a flexible Information technology architecture, which is accessible through the internet from lightweight portable computer hardware devices. Many universities and higher educational institutes all over the world have been adopted cloud computing resources and services. Cloud computing technology might be a new technology for education sectors in Sri Lanka. But they are planning to implement a cloud computing environment in Sri Lankan higher education system at the moment. It is important to identify the factors that influence cloud computing adoption in Sri Lankan higher education system. In this research paper, the research team has analyzed the factors which affect the adoption of cloud computing in the higher education system. Three variables were selected from the Technology-Organization-Environment (TOE) framework such as top management support, technology readiness and security concern. Data were collected through the questionnaire and the results were analyzed by the SPSS software for statistical analysis. The finding shows that there is a positive relationship between the variables to adopt cloud computing in the higher education system.

Author Keywords

Information technology, Cloud computing, Technology Adoption, Remote services, Portable devices, Technology-Organization-Environment Framework, Higher Education System

Introduction

Cloud computing is an inventive method to do the entire work through the internet. Many organizations have turned their sights to adopt cloud computing in their business. In present, the higher education system is also searching to find the best remedy to improve the efficiency of education. They believe the adoption of cloud computing will be the solution to overcome the challenges faced by the traditional higher education system. Cloud computing presents several benefits for e-learning by providing the infrastructure, platform, and educational services directly through cloud providers. The higher education system has planned to adopt cloud computing in Universities to improve the knowledge of the students and collaboration remotely. Students can use a virtual lab 24 hours a day. Online meeting and video chat also make it possible for students to study online and do their assignments. Cloud computing allows accessing real-time information from

anywhere in the world at any time. Cloud computing will give hands-on experience to lecturers to update their domain knowledge continuously. And also it will allow lecturers to access an application and other useful tools free of charge. On the other hand, the administration can prepare and develop courses and strengthening the curriculum. It will gather and absorb much more quickly and easily through internet access. There are many factors influencing the adoption of cloud computing in the higher education system. This research paper aims at studying the three factors from the TOE framework such as top management support, technology readiness and security concern.

Literature Review

Higher education demand for computing keeps on changing from time to time. Cloud computing provides them with the opportunity to utilize external providers and on demand services that are highly scalable and accessible via internet. (Armbrust et. al., 2009). Cloud computing is seen as having preceded the technologies required to tackle the trust challenges therefore creating a gap between adoption and innovation (Khan & Malluhi, 2010). Cloud computing also allows organizations to deploy their applications faster, with better manageability and less maintenance. This enables information technology to more rapidly align resources to meet changing and unpredictable business demand (Armburst et al., 2009).

Cloud computing in the educational sector as it enables students, researchers, lecturers and administrative staff at colleges and universities to access services which is provided by new computing system (sultan, 2010). One of the studies examining the determinants of cloud computing adoption by colleges and universities, found that factors like complication, institutional size and technological readiness are able to differentiate between the users and non- users of cloud computing (William & Xue, 2015). Cloud Computing can play a vital role in improving the quality of education by providing the educational content available to the student, academics, non-academics and the research scholar at the remote place. Cloud computing is the problem solver which can solve the problem, "Equal Quality education for all" (BV Pranay, Sumitha, & N. Uma, 2013). In the organizational context top management support, Support and integration with university Services, Skills of IT human resources, Security effectiveness and Cost reduction are the main five dimensions for the adoption of Cloud Computing (Mansour, 2015). Factors that affect cloud computing adoption are relative advantage, compatibility, complication, organizational readiness, top management commitment, and training and education, which is determined using perceived ease of use (PEOU) and perceived usefulness (PU) as mediating variables (Hemlata, Gangwar, & R. Ramaswamy, 2015). Cloud computing has intercommunicated a necessity for several higher learning institutions because it allows computing resources according user need, reducing management cost, resources cost, energy consumption and improving user scalabilities (L. Pushparani, Masih, Sanasam, & L. Sashikumar, 2014). Higher education of learning can take this as an opportunity to increase IT agility to support areas of educational, research and innovation activities through cloud computing. Collaboration and mobility is also promoted through cloud computing (Durani & Bhatt, 2015).

Day of Day, cloud computing adoption is increases. Multitudes of scholars in academia as well as organizations are bringing to cloud computing innovations to the education as a new technology system, guaranteeing and carrying more adaptable and dependable

to institution system. Numerous educational institutions have been recognized the potential advantages of adoption of cloud computing for new way to perceive new knowledge sharing and information delivery (Mircea and Andreescu 2011).Pushparani Devi et. al. (2014) has considered on present situation of ICT in higher education for cloud computing. They have added to a proposed theoretical system model of cloud computing for higher educator preparing establishment in Indian environment and talked about the implementation processed.

Methodology

The research was contacted to find out the significant factors in TOE frame impact the adoption of cloud computing in Universities and higher educational institutes in Sri Lanka. For this purpose, there are three variables were selected such as top management support, technology readiness and security concern. There are several methods used to gather the information for instance, observations of the process, inquiries and formal discussion with employees, students and management, issuing questionnaires and referring the past records of the higher educational institutes. From those many opportunity and risks identified in internal and external environment in higher education system.

According to the TOE model the following variables are identified to find out the significant variable that influence the adoption in higher education system.
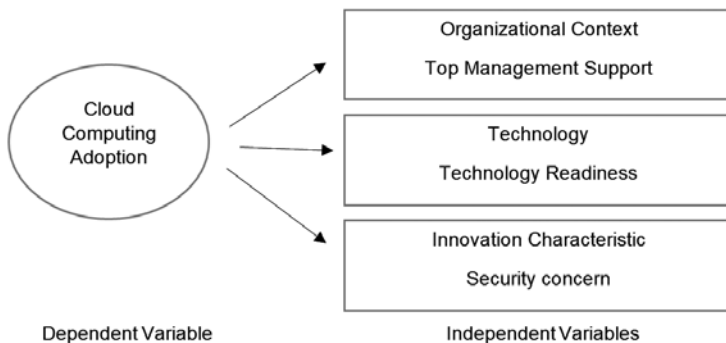
Figure 1: Research Model

According to the literature review the hypothesis are developed as follows:
H1: Top management support is positively influences to adopt the cloud computing in Higher Education System.
H2: Technology readiness is positively influences to adopt the cloud computing in Higher Education System.
H3: Security concern is positively influences to adopt the cloud computing in Higher Education System.

Data Analysis

Data analyzed by using SPSS software. Regression analysis, correlation and reliability test has been done to come conclusions. The sample consisted of a total of 100 people working in 5 selected universities and 5 higher educational institutes in Sri Lanka.
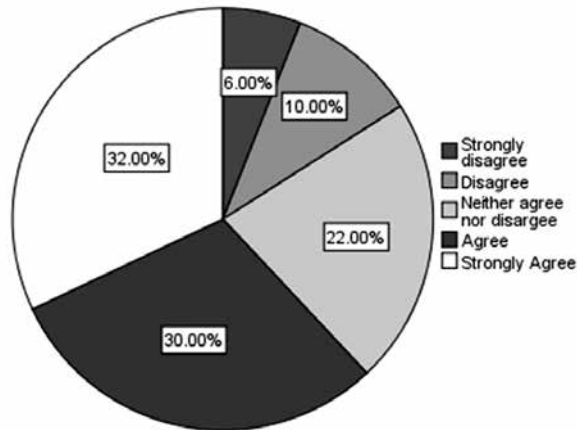
Figure 1: Willingness to adopt cloud computing

The above pie chart shows the willingness to adopt the cloud computing in universities and higher educational institutes, 32% of people strongly agree to adopt cloud computing, 30% of people agree to adopt cloud computing, 22% of people are in middle level whether they adopt or not and remaining 16% people disagree with adoption. According to the chart, 62% of people interested in adoption of cloud computing because of new methods of teaching, provisioning of educational facilities for online learning, teaching and research collaboration, smart labs and automation in maintenance and management of all academic activities. These reasons emerged them to adopt the cloud computing.

In this research mainly focusing the factors that influences in higher education system to adopt the cloud computing. Three independence variables selected in this analysis, such as top management support, technology readiness and security concern. The dependent variable is willingness to adopt the computing in higher education system. From pearson correlation analysis all three factors are positively influence the adoption of cloud computing. The top management support is important factor that influences the adoption of cloud computing. Because the top management wants to take decision regarding the capital investment and organization structural changes. If there is resistance to change it is impossible to adopt the new technology in the higher education system. The correlation of the top management support is 0.915 it shows high strong positive correlation. It is highly influences than other variables. The correlation between technology readiness and willingness to adopt cloud computing is 0.845, it shows the strong positive correlation meanwhile if the higher education system has enough technological capacity such as technical expert, hardware software capacity they prefer to adopt cloud computing. Higher education system panic to adopt the cloud computing because of security issues, if the cloud computing provides enough security to protect their data then they are willing to adopt the cloud computing which shows high strong positive correlation and that is 0.795.

The regression analysis specifies the relationship between dependent variable and independent variables. Linear regression analysis has done to find out the influences on dependent variable. The output indicates, R^2 value (0.928) that is 92.8% of variance in willingness to adopt cloud computing could be explained by collective independent

variables such as top management support, technology readiness and security concern. The significant value is 0.000, it is lesser than at the 0.01 significant level so null hypothesis is rejected and alternative hypothesis is accepted.

Conclusion

The aims of this research is to analyze the significant factors that influences in the adoption of cloud computing in higher education system. Result shows that top management support highly influences in the adoption of cloud computing as well as technology readiness and security concern also influences in the adoption. According this we can conclude that the above three factors positively influences in the adoption of cloud computing.

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Effectiveness of Paying Electricity Bill through Smart Card

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Abstract

It is very obvious that information technology is influencing every aspect of our daily life. World of technology is developing very fast in which devices are expected to perform work automatically, and at real time. Technology is applied to enhance quality of human life and make it hurdle-less. Human intervention is still a necessity when it comes to electricity bill payment for each household. This research paper proposes an automatic electric bill payment system which reduces human effort. This system is more portable, flexible and can integrated with different people.

Author Keywords

Electricity bill payment, Electricity usage, Smart cards

Introduction

The current procedure with regard to the electricity payment process isn't an automated system. It involves manual processes where electricity bills are issued to houses manually and payment is made by people, going to the nearest shop where bills can be paid. It is a big issue for people from villages, because the time spent and travelling cost is high, each time they pay a bill. To overcome this manual approach issues, few solutions like 'Onlinepay.leco.lk'[1] and 'Payeasy.lk'[2] were identified. But they are not much welcome in villages because few aren't aware about websites and few aren't ready to give their credit card details. To meet these problems, this paper suggests a device to make bill payment easily and securely. The device automatically synchronizes data online and shows it in a digital display, so the users can make the payment by swiping the smart card.

Suggested System

The main components of the device are digital display, Arduino Mega Microcontroller along with GSM Module and RFID Reader, Smart Card and Touch Keypad. The device will be connected online 24/7 with sim card technology. The smart card will have authentication to update amount from the device. The digital display will show the amount to be paid for that particular month by reading the online databases. The device will have the smart card plugged and the user has to give an input through the touch keypad by choosing an option (1-Check Card Balance, 2-Check Amount to be paid, 3-Make the payment, 4-Payment History, 5-Eject the Card). If user chooses No-3, a confirmation is asked, whether to make payments or not. If the answer is yes, the amount will be deducted from the money reloaded in smart card and the device will be updated.

Experimental

The research was carried out in our village Uyanwatta, Mawanella. This study uses the collected data from 100 houses. The feedback was collected from each house, including

time spent, travelling costs and the overall experience of making a payment. Below table shows the records taken from 10 houses.

Houses	Time spent (Minutes)	Travelling (Rs)	Overall Experience	New Device Suggestion
House 1	60	200	2/10	Good
House 2	45	100	4/10	Average
House 3	50	50	8/10	Bad
House 4	60	150	4/10	Good
House 5	60	150	5/10	Good
House 6	55	75	7/10	Good
House 7	60	90	5/10	Average
House 8	50	110	6/10	Good
House 9	60	100	4/10	Good
House 10	50	100	6/10	Average

According to the results,
Total time spent (100 houses) = 90 Hours (Nearest to hours)
Travelling Costs (100 houses) = 120,000 (Nearest to 100)
For overall experience, most of them have mentioned as average and poor because of the high travelling costs and time spent. In addition, most of them have suggested that having this device is good where their work is done easy. So, by considering these factors, implementing this device will be profitable for the country.

Below table shows the cost to make one device.

Components	Quantity	Price Per Quantity (Rs)
Arduino Mega Controller	1	1000
GSM Shield	1	1300
RFID Smart Card	1	15
Smart Card Reader	1	400
Digital Display	1	300
Number Pad	1	300
Other Components	1	200
Total Cost per device		**Rs.3515**

According to the above table, it costs Rs. 3515 for a device.
However, the feasibility of such a project for a third world country like Sri Lanka is a concern with regard to the cost factor involved. The project demands substantial investments. Will the country be able to meet the costs? Yes, this device costs only Rs.3515 for each household where people will buy once and use continuously. However, comparing to the travelling costs and time spent to make the electricity bill payment once

every month for a year, will cost high than the device. Below table shows the profit this country could make after 10 years of time by using this device.

These records are according to the feedbacks taken from 100 houses.

Year	Cumulative travelling costs per year (nearest to Rs.100)	Cumulative time spent Per year (Average in hours)	Device cost per year
1st year	120,000	90	210,900
2nd year	240,000	180	0
3rd year	360,000	270	10,000
5th year	600,000	360	0
10th year	1,200,000	450	0

This table clearly shows that travelling costs per year is Rs. 120,000 each time when they want to make the payment. People mostly travel 8 to 10 times per year to make payments which costs Rs. 900,000 for 100 houses (Average). By applying this device, people also could save 450 hours annually. This device is having an initial cost of Rs. 210,900 for 100 houses. The 1st year cost of the device will be high comparing to the travel cost but less human effort. According to the above table, each time when people make a payment, this device could save Rs. 980,000 for 100 families (After 10 years). This solves the main issue of the country where human efforts are needed to pay electricity bills and this might prove to be the best solution for each house in the country on a low budget.

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Use of High-Specification Observation Camera and What will be the effect on traffic violations?

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Abstract

The Ministry of Transport and Civil Aviation of Sri Lanka reported 2939 deaths by vehicle accidents and 3101 deaths by road accidents in 2017. The statistical count of injured people reports to 37,732, (Ministry of Transport & Civil Aviation, 2018). This is due to the careless drivers and incapability of issuing the violation tickets at the time of commitment of violation. Also the absence of source to capture any proof increases the violation. Generally in Sri Lanka, the traffic violation systems are not high-tech comparative to other developing countries. The study focuses on eliminating the number of traffic violations using a system to detect the violations.

Keywords

Doppler Effect, distance sensor, raspberry pie microprocessor, traffic violation, image processing

Introduction

The number of deaths in Sri Lanka keeps increasing every year due to irresponsible traffic violations and powerless evidence of reported violation. Capturing the violations and providing proper evidence to the authorities will ignite the responsibility of driving safely, but in Sri Lanka, there are no proper means of recording the violation.

This study uses an integration of devices to achieve the goal. A programmable camera is used to record the video footages of the violation of vehicle for image processing. Sensors that use Doppler radar to detect the speed of the vehicles are used.

Finally, a program that detects the movement of vehicles through the video footages is used. All of the features combined form the high specification observation camera.

Methodology

Doppler radar is a device that emits radar signals and strikes an object at a distance to calculate the velocity of that object using Doppler Effect. This is achieved by sending a microwave signal to the intended object and receiving the reflection of the signal to analyse how the motion of the object has altered the frequency of the reflected signal. A radar sensor is used to produce the speed of any object within the range of 7 meters. This device can be connected to a Raspberry Pi microprocessor, making it effortless to collect the output data.

The microprocessor is programmed to use the velocity value from the radar device and initiate the camera to capture the video footage of the vehicle if the value of the velocity is greater than the programmed value. This camera is attached to a Raspberry Pie module itself that is programmed to monitor the movement of vehicles, recording

video footages. The camera keeps analysing movement of vehicles for any abnormal movement or movement of vehicle in the opposite lane, using the concept in which a distance sensor is used to calculate the distance of the overtaking vehicle. The reduction in the value of distance will trigger to capture the footage of the overtaking incident. The video footages taken from the camera are stored in a database which is then processed using image processing techniques to identify the number plate of the vehicle for issuing speed tickets and traffic violation fines.

Experimental

This study has tested in Kandy – Matale road at 5 different locations. The data has collected for duration of 1 week. The data includes over speeding and illegal overtaking violations. After the data has provided to the authorities and the relevant violators were fined, the amount of violations reduced two days later.

Date	Time	Location	No. of over speed	No. of illegal overtaking
10/01/2018	6 am – 12 pm	7.4165303, 80.6118266	5	10
11/01/2018	12.30 pm – 6.30 pm	7.41146206, 80.6077395	6	12
12/01/2018	6 am – 12 pm	7.464570, 80.6107409	3	8
13/01/2018	12.30 pm – 6.30 pm	7.4023685, 80.6131901	3	9
14/01/2018	6 am – 12 pm	7.3420199, 80.6189948	13	0
15/01/2018	12.30 pm – 6.30 pm	7.4165303, 80.6118266	4	8
16/01/2018	6 am – 12 pm	7.41146206, 80.6077395	7	10
17/01/2018	12.30 pm – 6.30 pm	7.464570, 80.6107409	2	5
18/01/2018	6 am – 12 pm	7.4023685, 80.6131901	2	6
19/01/2018	12.30 pm – 6.30 pm	7.3420199, 80.6189948	7	0
20/01/2018	6 am – 12 pm	7.4165303, 80.6118266	1	3
21/01/2018	12.30 pm – 6.30 pm	7.41146206, 80.6077395	1	7
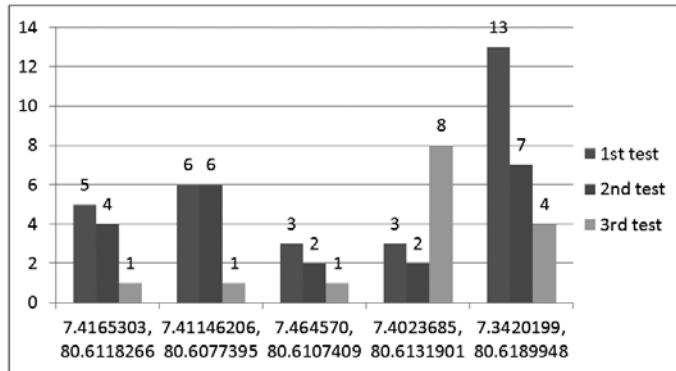
The above graph shows the data collected for the number of over speeding vehicles. The 1st test has done without notice of the drivers. The 2nd has was done after the speeding tickets were issued to the violators. The 3rd test has conducted while fixing a warning sign that says camera is ahead.
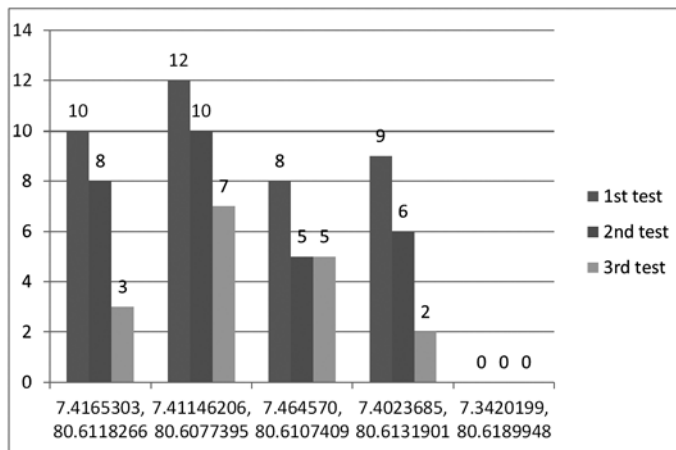
The above graph shows the data collected for the number of illegal overtaking vehicles. The fifth location is a straight road where overtaking is allowed therefore none of them were violators.

From the above graphs, the difference of violations before the drivers knew about the camera is very high compared to the no of violations taken place after the traffic violation fines were issued. In most locations, the number of violations has reduced gradually. This proves that this study can reduce the number of accidents caused by traffic violators, hence reducing the number of deaths and injuries caused. The results from this study ensures a safe and drivers with careful minds will be encountered in the future.

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Systematic Review of security Vulnerabilities on web-based application

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Abstract

Today the Web application security threats have posed several challenges to secure the web application from attackers to ensure digital data security of any web application that is hosted in to World wide web (WWW). The web application that are developed by the developer in an inappropriate security environment to the vulnerabilities that exist in the application, so most of the application they have high security demand that are running on web   Therefore, the research review is conducted with several vulnerable attempts to various kind of web application, to take the final outcome results from each application and how this kind of application are resulted on vulnerable.

Keywords

Web Application security Threats, Digital data, security

Introduction

With the explosive growth of internet, people are adapting to social networking, E-commerce and virtual learning environment, this have opened new possibilities to accomplish tasks in much effective way, because of this growth the users account and other information on the web application have become more vulnerable to fraud and other attacks. Even Though the advancements security is present in application; when it comes to web application which hosted on the (WWW) World Wide Web, Still there are huge security demand for certain application that are running on web.

One of the major issues on the web is the hackers in the recent days they are targeting on web application which has more valuable data's and user personal data, this led to lost more sensitive data on the web application that has been misused by the attackers. Therefore, to provide an efficient solution for above mentioned problem, as well as giving a review on the major application like social networking, virtual learning environment, E-commerce and other application. Showing the vulnerabilities test result that are implement on this application's recently.

Experiment

The implementation of vulnerabilities mechanism was used to study and test the attacking method by each application to get the specific attempt done on each web application. For the study propose several web applications has been tested for this examination. From each vulnerability attempt the final outcome result was taken to review the security vulnerabilities on them.

The above parameters have been collected after several web application attempts that are high on security and low on security on web, to get some real attempts 1 month of

time period was allocated to test the attempts on the applications.

The goal of the research study is to show, how vulnerabilities is consisting on this kind of web applications.

The test was done using above mentioned parameters for 1 months, for each classified web application, to check how vulnerabilities are behaving on this web application. For that 6 major vulnerabilities attempt were taken and also 40 random web application were taken to test the attempts on application. In order to check the vulnerabilities on web application the web application was categorized to 4 groups as shown in the below graph. Implementing each vulnerability attempts on each site to get the proper results on vulnerabilities.

After getting the above data it was used to analyze how vulnerable were this application on this kind of attempts. The following graphs shows the vulnerable attempts results on 4 kind web application, during the time period of 1 month.

Conclusion
Based on these data the conclusion on the vulnerabilities that has been tested on the web application. As the result is shown on the above graphs it is clearly noticeable the most of the attempt that are done on high security environment application got failed, most of the application are moderated to these kinds of venerable attempts, some attempts were lost. In some application where there is low in security, some results got success results and some got failued depending on the security on them. There were some reason it got failed most of them are update to date, so, This was a great challenge of this research was finding the vulnerable patterns styles to some web application, based on the results above it gives an average knowledge how secure is this kind of application.

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Impacts of Different Types of Vulnerability on Mobile Phone Passwords

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Abstract

The rise of technology has shown up the path for several innovations. With the growth of technology, the world is growing rapidly and so the Mobile Technology is. There are so many mobile phones in the market, which are mostly purchased, but most of them have a security issue in locking their personal data. This study shows the impact of different types of vulnerability on Mobile Phone Passwords.

Keywords

Complexity, PIN, Pattern, Password, Fingerprint, Face Recognition, Picture Passwords

Introduction

Mobile phone plays a major role in humans' day-to-day activity, where all their personal information is stored in it. Even though they have a mechanism of securing the data using passwords, they are several vulnerabilities available in the password mechanisms. According to the PIN code it is the basic and where the minimum (4 pin) gives 10,000 combinations and the maximum (16 pins) gives 10 quadrillion combinations. [ref 2] Pattern Passcode has 9 dots where maximum connection (4 dots) gives 1,624 combinations and maximum (9 dots) gives 140,704 combinations. Passwords are long and are usually used as sole authentication mechanism, [ref 3] When it comes to face recognition, it identifies a person from a digital image or a video frame. Fingerprints are detailed, nearly unique, difficult to alter, and durable over the life of an individual. According to the Picture Password, it requires a picture where a number (0-9) should be placed in a spot of the picture to unlock it. [ref 5] The password work even the placement of number is 10px close to the spot, and also uses a spacing method in-between numbers like Large (6*8), Medium (7*9), Small (8*10) and All Overlaid and gives 10 tries to guess the password.

Methodology

The above mentioned passwords mechanisms were tested using an IPhone X, IPhone 7 plus, Galaxy S6, galaxy S7 and Galaxy S5, Oppo F5 and Blackberry Key1. Where mainly IPhone X has used for the face recognition, IPhone 7 plus for waterproof phone with fingerprint sensor, galaxy S6 for testing the pattern and password, Oppo F5 for the face recognition and finally Blackberry key1 for the picture passwords to find the complexity of the passwords.

The Face recognition has tested using several parameters like the distance in between the face (user) and the mobile, similar faces and under water. Fingerprint has tested under the parameters like; underwater, with dust, wet hands and oil. Picture password has tested by sliding the number plate to different locations.

Experimental

Pin code was tested using the above mentioned phones, where it resulted the minimum numbers it can go for was and the maximum was 16, Although it is secured remembering a Pin more than six is a difficult task as human brain is weaker to remember numbers. This reduces the complexity of the Pin code and having common pin codes like "0000", "2580", "1234" and the birth year increases the vulnerability of the Pin code.

Pattern Lock test resulted that it is the most used password mechanism by the Samsung users. It has nine dots where the minimum connection (horizontally, vertically or diagonally) can be up to four and the maximum can lead until nine. However, the bad side of it that most of them make passwords easier like the first letter of their loved ones, drawing common shapes, which increases vulnerability.

Password test proved that it can have minimum of 4 characters and 16. This password mechanism can increase its security using lowercase, uppercase and symbols and insertion of spaces and misspelling makes the passwords stronger and makes it harder to guess by others. Usage of common words should be reduced in order to vulnerability. Fingerprint test resulted that the finger print sensor on behind the phone was easier to access than the one on front due to the flexibility. This has a minimum of one fingerprint, which can be extended up-to 10. This mechanism does not work under water, dust, oil, gloves, cut finger and wet fingers. The worst part of this mechanism is even though this fingerprint is unique this can be fooled by making a 3D print of the user's finger.

Face recognition resulted that, IPhone X has much efficient than Oppo F5. The test result was they were not able to recognize faces on water and Oppo F5 was able to unlock at a gap of 50cm where the phone was in the hand of the another than the owner of the phone.

Finally, picture password was tested using a blackberry, but although its highly confidential that its harder to guess the password there are some failures like 10 attempts are much enough to guess it, so it would be better if it is reduced to 5 and also it would have been more effective if there are also alphabets to increase the complexity of the password as there are more characters.

Test Results of Complexity in Mobile Phones (%)						
Phones	PIN	Pattern	Passwords	Fingerprints	Face Recognition	Picture Password
IPhone X	40	0	90	0	80	0
IPhone 7	50	0	90	90	0	0
Galaxy S5	60	45	90	90	50	0
Galaxy S6	60	45	90	87	50	0
Galaxy S7	60	45	90	88	50	0
Oppo F5	60	0	90	98	60	0
Blackberry Keyone	60	0	90	0	0	70
Total of Results	390	135	630	453	290	70
Average	55.7143	19.2857	90	64.71428571	41.42857143	10
round off Average	55.71	19.29	90	64.71	41.43	10

Complexity of Password Mechanisms
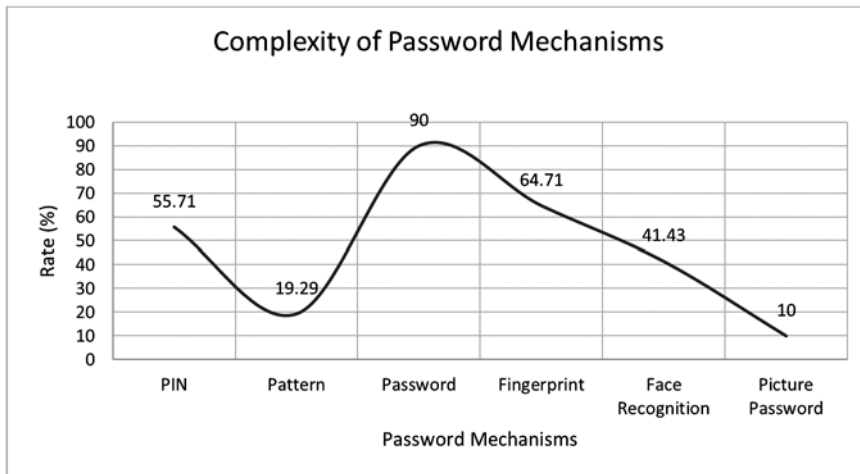
According to the test done it clearly states that Password with more characters stands on top as it is secured by using of misspelled passwords, Uppercase, lowercase, symbols and Numbers which makes that strong, the fingerprint stands second because of its uniqueness that no others can use it unless they create a 3D fake ID which is a vulnerability factor, when its face recognition only one mobile uses it more precisely with advanced techniques which makes it stand on the third place, PINs are more secured than patterns as numbers are harder to remember than patterns it was pushed down even though numbers were harder to remember it was used in a less secure manner by the common people by using something simple, Finally picture passwords come the least due to the 10 trial attempts where it can be easily guessed by random pushes and the line spacing changes in between each and every trial. Therefore, This study ensures that the character password is the best mechanism to secure mobile phones due to higher complexity.

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Centralized web based and geo location-based charity management System

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Abstract

There has been not much research and innovation done into the 3rd sector by technology students in order to boost and improve the management of social venture. Even though this thesis is not generic to all non-profits and social enterprises, the subject revolves around charity management. Charities are a constant growth in context of Sri Lanka and there are nearly seventy-five approved charities as per the gazette of the Sri Lankan government. And there are various other foundations registered as non-profits engaging in charities and many other NGO's that operate. Social entrepreneurship is being initiated and this sector is highly in need of technological infrastructure in order to manage charities. The traditional manual methodology to handle charities that spans across Sri Lanka is vulnerable to a lot of fraud and this is not the case in only Sri Lanka but anywhere else in the world. Thus, I see that contributing to bring about a certain level of automation into charities would reduce the vulnerability to fraud and theft to a certain degree. the scope to this implementation is limited as the requirements I am working on is limited to a certain case which would be addressed. researcher has added in the features of intelligently identifying donations based on location. The idea behind this is that people can be satisfied to the fact that their donations are being used fruitfully and they know exactly where and how their money is being used for social welfare. More over the importance of innovation in charity management is discussed. There is a need for automation to a certain level in order to minimize human intervention with the cashflow this is due to the fraud and theft that is reported by authorized bodies so this system would be addressing that issue to.

Author Keywords
Charity, Web, Management, System

Introduction
In Sri Lanka there is the lead Muslim association which is advancing the gathering and dissemination of Zakat as a network and distribute as per the requirement, starting at now the mosques are responsible for this procedure, this is the present practice and there is no legitimate composed path for riches dispersion and should take note of that the circulation procedure is extremely one-sided and that the fund is by and large effortlessly played out in this manner author think that its more fitting to build up a site to join the giver and the beneficiary and by this there would be a proficient manner by which assets would be given to the required body, by this robbery and extortion would likewise be stayed away from to a specific degree. Author's execution is only a commencement, author has given a reasonable arrangement keeping in mind the end goal to address an issue looked by this general public and discovered this module would be suitable. The improvement can have more to it since its present deployment is constrained.

Experimental

Rather than simply staying into the customary framework it would convey a considerable measure of significant worth and efficiency all together the execute the part of innovation into philanthropy administrations. The reasons as cited by the creator of this paper are that by the moving of philanthropy administrations to the innovative circle is that unnoticed voices would fortify, movements are improved and efficiency would be expanded. (TSIconsultancy, 2017).I n an article composed by Claudia Cahalane clarified why there is a need development considerably more in philanthropies. The advanced domain has sneaked into each angle in the every day life of the general crowded. It is just the advanced gap that isolates a couple of nations which are immature and a few areas in creating nations. A consummately created tech arrangement ought to be available in the non-benefits too for the advancement of the social circle of the general public, the reason she states is that by this the representatives in non-benefits would be liberated, there would be openings for a more extensive reach of individuals and the last profitability and effect would be unrivaled by degrees. At last, she reasons that the execution of the tech circle into the third division alongside the current advanced upset would make open doors for individuals and networks to help their social improvement. What's more, as of now when there is an expanding request it is much pivotal to manufacture and execute the advanced measurements in foundations keeping in mind the end goal to join tech for the improvement of the administrations given by the distinctive third division associations. (Cahalane, 2017)

The essential point of the experimentation was to build an online entry to interface the contributors and beneficiaries with land data to streamline the procedure of gathering and conveyance of assets. This was effectively executed with clients having the capacity to begin battles and advise the givers that they need assets alongside their area and guests who visit the site either by the spread through different internet-based life stages need to simply physically input their Visa subtle elements and make the installment the client can either be mysterious or give his points of interest to show in the website.

The second point of the analysis was to locate an appropriate installment door this was done seriously and the proof for it very well may be found in the writing audit. Different angles, for example, the security alternatives the installment portals offer, the adaptability to engineers, the expense it charges from the dealers and the client administration of these installment processors were talked about. A factual examination was likewise done in the ongoing years and it was seen that stripe is developing as a market pioneer and how the present pioneer in the market which is PayPal. PayPal had a piece of the overall industry of 91% before the finish of 2015 according to Datanyze however toward the finish of 2018 they were left with just 68% whereas stripe blasted up from 3% of the market to 18%. The explanation behind this was PayPal couldn't adapt up to deal with the expanding clients, they had no appropriate API for engineers and the security alternatives were shabby. Along these lines, from this it was chosen to consider Stripe installment entryway as the better choice and to execute it in the site. At first it was chosen to incorporate PayPal as well as a choice yet since Stripes virtual terminal was so natural to execute and utilize PayPal was not utilized. Furthermore, with respect to the need to actualizing an area-based philanthropy administration framework, it is truly necessary.

With respect to the objectives of this analysis it is to comprehend the significance of development through innovation in the third segment. According to the data incorporated into the writing audit it is comprehended that the general population are anticipating that the third division should become possibly the most important factor since it has come in with their lives. More over as Anita Small clarified there is a more extensive reach by incorporating innovation into the third division. Concerning the following of the targets it is to execute a working model of a responsive site with geo-area and installment capacities. The site was actualized in CodeIgniter system and the front end was finished with bootstrap. This framework has a great deal to enhance in specialized terms and also administration insightful. The key point of the framework is to oversee Zakat where as in here it is available to anybody to come and do their gifts and the concentration here is that the giver meets the beneficiaries where as an expansion in the administration viewpoint might be to assemble a database of each one of the individuals who pay a yearly sum on the amount they would pay and rather than them paying to the mosque they are in they can pay to this entry, by this as talked about in the writing audit too we could lessen the human mediation between the stream of money along these lines diminishing the odds to extortion. The motivation behind why author couldn't execute this in this framework is since the degree is too huge to convey it in a national level and I as an individual would be in no place to perform it, however this thought and venture is available to the exploration network and any one intrigued could take this task and send it later on. With respect to another disadvantage which could be seen when fundamentally broke down is the advanced partition this is a noteworthy issue since the entire country isn't yet in a state to acknowledge this framework since a lot of individuals in Sri Lanka who pay the yearly Zakat isn't educated as far as innovation. Be that as it may, as author assumes examination network we are obliged to execute innovation into any part of the life despite the fact that the network isn't yet in a condition of availability for it since this would enhance with time and the network would have a very much characterized framework to utilize when they are in a state to utilize it.

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Development of 3D Rubik's Cube Game

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Abstract

The Rubik's cube, which is one of the most famous tools among the young mathematicians, business leaders and children, which is used to develop the thinking skill and helps to build our mind to think critically. The Rubik cube was invented by Erno Rubik and the cube was named as Magic Cube, later to acknowledge the inventor it was called as Rubik's Cube. There are so many people who uses the Rubik's cube with no idea who's Erno Rubik.The Rubik cube, which was then called as Magic cube invented by Erno Rubik was licenced to Ideal Toy Corp. The game has won so many awards during that time and still one of the best puzzle game in the world. In the year of 1980, Rubik's cube was entitled as the Game of the Year in Germany. This simple puzzle game was considered as one of the world's best-selling toy, which was sold more than 350 Million cubes by the month of January 2009.The basic Idea of this application is very similar to the original cube but with the help of some modern technology, the system is currently focused on Web application, where a user with a Web browser would be able to use the game. The same system can be implemented to mobile browsers too, smartphones with multi-touch functions would support this game more efficiently. The diversion created is as comparable as that of the Rubik's Cube. Analyst was Researching about the advancement of the Rubik solid shape, there are such a large number of new things has been refreshed, at long last the Rubik's diversion itself has been supplanted by some new Rubik's block resemble the other alike recreations, which is essentially not for building up the reasoning aptitudes but rather more probable another toy to sit idle with.

Author Keywords
Rubik's Cube, Rubik Spark, Game, Player.

Introduction
As an acquaintance the thought is with examine about Game advancement and its history, the historical backdrop of amusement improvement began from 1950s, those days they were outlining and executing straightforward recreations as a major aspect of their examination which implies they were doing it to discover some excitement and for entertainment only which diminished their level of pressure, however sadly it didn't achieve that much till 1970s.At the point when the amusements were intended to play utilizing joystick and utilizing catches for the arcade computer games and different stuffs with the designated illustrations in the PC and furthermore after every one of the explores on diversion improvement they assumed that it could be an incredible stimulation for the general population so they chose to present it for the external world.

Experimental
Solve Rubik Cube is a virtual amusement created by ATUL_LOONA, his username. The name has been set to private. He discharged it on eleventh October 2010. The amusement is produced for PCs as a Computer Software, which is distributed to clients

as an .EXE record. Keeping in mind the end goal to play this amusement, a client needs to introduce this document in his PC, the procedure is like the way toward introducing a product like iTunes to your PC, it will essentially introduce the records in a particular registry as client characterized or default area. This amusement is created utilizing the .NET3.5 Framework. Structure is essentially a library with predefined capacities, it's likewise called as libraries. As the amusement is produced upon this system, the diversion is totally relied upon this structure. For a PC to have the capacity to run this amusement, the PC must have the applicable or the most recent system else the diversion won't run. Each time a client begins the amusement, it will crash. The diversion additionally utilizes the 3D models which is adjusted and put on a 2D surface utilizing the fundamental counts and numerical tasks which likewise contains a few calculations as per the Erno Rubik's model. The amusement likewise made with the assistance of GDI+ and the framework counts. (ATUL_LOONA, n.d.) The 3D block is masterminded on a 2D plain layer utilizing the Co-ordinate framework. Co-ordinate framework is a technique for speaking to focuses in a space of given measurements with the pivot X, Y, Z. every one of the three pivot are opposite to one another. The 3D square in this diversion is made with 27 minor blocks orchestrated painstakingly to make an enormous 3D shape, that is called as the Rubik's Cube. As this diversion is intended to be played in PCs, the designer has utilized straightforward catches to control the Rubik's block. The catches in the edges are to pivot the 3D shape's point of view. The bolt keys close-by the solid shape is to turn the 3D square itself. Every bolt will turn each side of the solid shape. By utilizing the gave catches and bolts a client needs to reset the solid shape into its default position.

The Developed project has been arranged, actualized and tried effectively. The Project was discharged for Websites right now. The undertaking is responsive and it bolsters different screen estimate, for more data about the testing techniques please check the archive. The site was additionally planned with the systems and pursues the best possible HTML5 Standards and utilizations the most recent renditions of jQuery. The following thought is to transfer this diversion in to a site called Miniclip. Miniclip site falls into the diversion classification. It's a site that gives a great deal of smaller than expected recreations for players uninhibitedly, they enable clients to play against one another. Generally the recreations that are made utilizing Unity Software application. The site contains in excess of 500 scaled down amusements which are accessible for the clients to play uninhibitedly, and there are in excess of 15 classes of diversion compose. There are such a large number of diversions for kids and grown-ups too, everybody is invited there to play. The greater part of the amusements in this site is composed utilizing Unity application, where an individual or a gathering can partake in a venture in making diversions and transferring it on play store, App store, Miniclip or some other comparable applications and Miniclip has additionally built up a diversion called "Rail Rush" which is supporting android and IOS and it is in rundown of best 10 relentless running recreation. The game has been effectively created as an electronic framework and it can be played by players in any age classification. The amusement has no viciousness and it has no confinements for the clients. The game can be played the same number of times as a player needs. The amusement is unquestionably a self-mitigating instrument for the clients and it is an incredible information creating device too. The task was created proficiently and the item is wanted to be discharged less costing or costless by any stretch of the imagination. The player can modify the level of hardness as indicated by

his need. The diversion will be actualized for cell phones also in not so near future.

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Cloud based business continuity and disaster recovery solution to protect on premise server workload

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Abstract

Considering this present world, it is currently days the innovation is developing step by step and the human workloads continue expanding tremendously. The most viewpoint despite the fact that the innovation is quickly developing the general population continue pondering their profitable information and data. There are numerous potential outcomes and odds of losing their information and data whenever even without their insight. It is an obligatory follow up on every single individual to keep tract on their assets with a reinforcement when required whenever. Thus, with a specific end goal to conquer this issue this undertaking is produced as a catastrophe recuperation reinforcement answer for database server or application. This project completely centers around the cloud stage (Microsoft Azure) which incorporates into setting up secure encoded associations with the related cloud, the heap adjusting/Traffic administration, outline of the virtual neighborhood on the cloud and the provisioning procedure and completely engaged with the arrangement of the virtual machines, as that proceeding with the way toward testing the failover to cloud and failback to the essential site. The artifact that is created in present project is a cloud-based execution which is planned, created and tried keeping in mind the end goal to give the high accessibility to the on-commence servers and workloads running inside the virtual machines and which goes about as a reinforcement strategy. Just to state the cloud occupant which incorporates extensive variety of the related parts, for example, the virtual machines, Traffic administrators, Recovery vaults and the most vital viewpoint as the distributed storage, which are associated subsequently to accomplish the fiasco recuperation arrangement and also the business progression in a helpful and in a dependable way. The essential angle that is created in this cloud-based venture utilizing Microsoft Azure is that, the connections and qualifications to the related cloud account, screen catches and the PowerShell contents that have been delivered and utilized for the improvement is delivered methodical with a superior learning of comprehension.

Author Keywords

Cloud, PowerShell, Failover, Failback, Data, Server, Workload, disaster

Introduction

The disaster recovery solutions guarantee business progression by keeping the applications and databases running on VMs and physical servers still accessible if an essential site goes down. Thus, by this note the key point that can be called attention to is that the arrangement recreates outstanding tasks at hand running on VMs and physical servers with the goal that they stay accessible in an optional area (in cloud) if the essential site isn't accessible. In this way, by this procedure it recuperates outstanding burdens to the essential site when it's up and running once more.

Experimental

The ancient rarity that is produced in this undertaking is a cloud-based execution which is composed, created and tried keeping in mind the end goal to give the high accessibility to the on-introduce servers and outstanding tasks at hand running inside the virtual machines and which goes about as a reinforcement technique. Essentially to state the cloud inhabitant which incorporates extensive variety of the related segments, for example, the virtual machines, Traffic directors, Recovery vaults and the most imperative viewpoint as the distributed storage, which are associated accordingly to accomplish the debacle recuperation arrangement and additionally the business progression in a valuable and in a solid way. The critical viewpoint that is created in this cloud-based undertaking utilizing Microsoft Azure is that, the connections and certifications to the related cloud account, screen catches and the PowerShell contents that have been delivered and utilized for the advancement is delivered efficient with a superior information of comprehension.

This concept is followed the discoveries and taking in the downsides that the general public if looking in securing their information and data requiring for a calamity recuperation arrangement should be given in this project. Since the cloud innovation is developing step by step numerous associations including in business needs to guarantee the most critical perspective is that, keeping their applications and the assets being reinforcement and guarantee the outstanding task at hand is lessened also. The principle procedure that is given to itemized in this basic assessment is that it recuperates the remaining tasks at hand to the essential site that is made when it's up and running again agreeing the district the servers are made thinking about the various virtual machines. The procedure that is followed in the task is on making the virtual machines in Microsoft Azure that is to go about as a web server with the well ordered that was pursued as portrayed above to turn out with the ancient rarity (expedient, 2017) The site recuperation that is made all together for the chose virtual machines ought to be designed with the recuperation purpose of target in straightforward knows as (RPO)(SearchStorage. 2018), on the grounds that to keep the information and data's ought to be known on which virtual machine it is apportioned and recouped. With final product to ensure the total procedure the DNS which is known as the domain name framework ought to be arranged by the settings that incorporates the area enlistment all together with the activity supervisor setup agreeing with the well-ordered method that is pursued. With the assessment procedure the debacle recuperation arrangement that go over imitates the measure of outstanding burden that is running on the virtual machines and the related physical servers that will at present stay accessible considering the optional area that is accessible in the cloud regardless of whether the essential site isn't accessible around then, so this can be the fundamental assessment building up this task to work in the business of each person effortlessly. The primary design is clarified in this venture investigating the cloud stages, the ideas that is utilized, the advances that is executed and all the related engineering that is included and connected with the fiasco recuperation. Likewise, it incorporates the scope of many cloud investigations that has run over in the cloud business with the headway of the advances that is refreshing step by step. The disadvantages that can be considered in this development there ought to be web at all cases in running the web servers and the virtual machines keeping in mind the end goal to work easily. Likewise, the other principle reason is that will run a failover if the web association goes down and when the virtual machines are not prepared when required.

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Implementing Keystroke Dynamics as a Multi-Factor Authentication in Passwords to Minimize Security Vulnerabilities

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Abstract

Verification of the identity of a user before accessing a system is known as authentication. User authentication is important for security. Multi-factor authentication is the requirement of more than one method to verify the identity of a user in order to reduce the security vulnerabilities. Yet, the vulnerabilities exist. Keystroke dynamics is the information regarding a user's typing patterns such as the time taken between two key presses (time duration between releasing a key and pressing the next key), the time duration that a key is pressed and more. This study assesses how implementation of keystroke dynamics as a multifactor authentication with a password helps to increase the security of a system and its effectiveness.

Author Keywords

Vulnerabilities, Keystroke Dynamics, Passwords, Multi-factor Authentication

Introduction

In the recent times multi-factor authentications have become a popular solution to reduce security vulnerabilities. Keystroke Dynamic is one factor that is upcoming to help improve the security of user authentication systems where the different typing patterns of the user is considered such as the time interval between two key presses (Giroux, 2009) and the types of key combinations pressed such as whether left shift key was pressed or whether shift right key was pressed to obtain a capitalized letter (Rubin, 2000).

In this study, the keystroke dynamics will be considered in relation to a timer, where the time duration between each key press will also be considered other than the password itself. The mean time of typing the password is considered so as to verify the user's identity and avoid unauthorized access. A small login application has been created to test the keystroke dynamics in consideration of mean time as a multi factor authentication.

Experimental

This study refers to keystroke dynamics with passwords in relation to a timer. A simple interface of a login form was created. Here, the password field has a timer in relation to obtain the keystroke dynamics data from the user. When the user inputs a value, the timer starts. Supposing that the password contains a maximum of 14 characters, a loop is associated letting the user input the values up to 14 characters into the password field. Once the number of characters has reached, the timer stops. The total time is obtained from the timer and then the mean time taken is calculated as shown in the pseudocode below for when the user first enters the password to register;

```
START
int count;
int attempt;
float time_duration = 0;
float mean_time = 0;
float roundoff_mean_time = 0;
float timer_array[3];
float allocated_time = 0;
float variation_rate = 0;
Print "Enter Email";
Input email;
for (attempt = 0; attempt <=2; attempt++) {
        Print "Enter Password:"
        input character;
        activate timer;
        for (count = 1; count <= 13; count++) {
          input character;
        }
        stop timer;
        timer_array[attempt] = timer;
        time_duration = timer + time_duration;

}
mean_time = time_duration / attempt;
roundoff_mean_time = round (mean_time, 2);
T2 = timer_array[1];
variation_rate = math.abs(T1 - roundoff_mean_time);
Ceil_variation_rate = ceil(variation_rate);
Allocated_time = roundoff_mean_time + variation_rate;
Print allocated_time;
STOP
```

The mean time is calculated based on the attempts provided, in this application the initial attempt count is considered as 3. Therefore, the user has to confirm the entering of the password 3 times such that the time for each attempt is considered;

$$\text{Round off of Mean Time} \approx \frac{(T1+T2+T3)}{3}$$

Considering one user, the time taken is not always the same when typing, this was proved when letting 50 users test on the application. The experimentation was done such that all the participants of the experiment was given the same strong dummy password consisting of 14 character, '4759AcW6a@bcas', in order to get the output results.

Since there is a variation in the attempts, it is necessary to consider a 'mean merit time' for the users allowing an extra time that allows to suffice a user's average typing time. More or less the typing time of a user varies between 1 – 2 seconds. Timing of Attempt 2 (T2) is considered an average to calculate the rate of variation. Therefore, the extra time provided when the user enters the password can be derived by an expression;

$$\text{Rate of Variation (Ceiling Value)} \approx ceil\left(T2 - \frac{(T1+T2+T3)}{3}\right)$$

The final expression can be derived using the mean time and the rate of variation thus it is unique for each user;

$$\text{Time Allocated for Authentication} \approx \left(\frac{(T1+T2+T3)}{3}\right) + ceil\left(T2 - \frac{(T1+T2+T3)}{3}\right)$$

Following table shows the data for 5 users out of the 25 tested users;

User No	T1	T2	T3	Mean Time	Rate of Variation	Ceiling Value of Rate of Variation	Round of Mean Time	Allocated Time
1	11.59	10.93	10.81	11.11	0.18	1	11.11	12.11
2	10.27	10.94	9.17	10.12667	0.81333333	1	10.13	11.13
3	9.17	8.63	7.72	8.506667	0.12333333	1	8.51	9.51
4	9.62	7.93	8.72	8.756667	0.82666667	1	8.76	9.76
5	10.55	9.41	8.03	9.33	0.08	1	9.33	10.33

The following graph shows the overall results of the 25 out of 50 participants and corresponding unauthorized users on their system for the experiment;

Unauthorized User Time vs. Authorized User Time
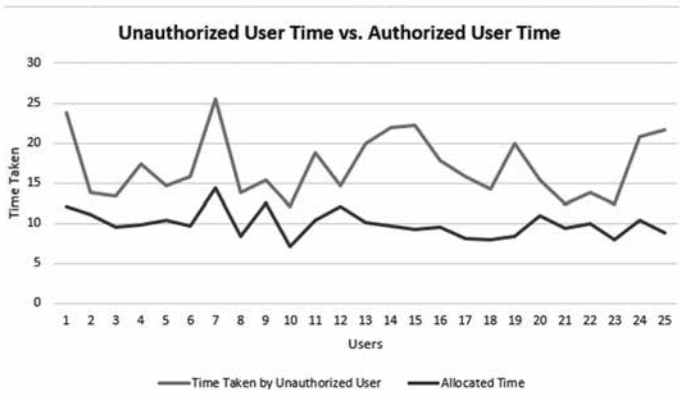
The following pseudocode refers to the login system once the keystroke dynamics in relation to the allocated time is considered;

```
START
Password_time_duration = 0;
Print "Enter email:"
Input email
Print "Enter Password:"
input character;
activate timer;
for (count = 1; count <= 13; count++) {
          input character;
}
stop timer;
password_time_duration = timer

if (email == true) {
       if   (password_time_duration   >=   roundoff_mean_time   &&
          password_time_duration >= allocated_time) {
                 if (password == true) {
                        Print "Successful Login"
                 }
       }
       Else {
             Print "Password timing incorrect"
       }

}
STOP
```

Thus, this research proves that the final output for each user varies. Hence, keystroke dynamics is unique because the range is based on the mean time calculation and the allocated time assigned. Therefore, when an intruder tries to log in, the system will not allow the him to log in since these two criteria should be met. This was tested with 50 unauthorized user who was given the dummy password for the first time to test on already registered users. Following data is based on 5 of the 50 tested unauthorized users on 50 of the authorized users;

User No	Time Taken by Unauthorized User	Allocated Time	Time Difference for unauthorized users
1	23.85	12.11	11.74
2	13.74	11.13	2.61
3	13.44	9.51	3.93
4	17.36	9.76	7.6
5	14.7	10.33	4.37

It can be observed that the time difference between an unauthorized user and the allocated time of the authorized user is differs in larger value there for based on the following logic, an unauthorized user cannot login to the system.

Mean time taken when registering	<	Time duration taken to enter the password to login to the system	>	Allocated time when registering

Due to the validation of the password time duration before the password validation, this system is made more secure because, when a user enters the password. Even if the user knows the password, he would not be allowed to access the system unless the password time duration is met. Therefore, this mechanism along with a password and an encryption will be one of the greatest challenges for an unauthorized user because other than the 14 characters long password, the mean time allocation and rate of variation is needed.

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Intelligent Street Light System using Image Processing

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Abstract

Street lights have been part of the landscape in most countries for the better part of a century. First there were gas lamps and later, electric lights. The street lights help light up the roads after darkness falls and make the streets safe for pedestrians and motorists. It is a necessity but somewhat costly exercise. It does cost quite a sum to keep them lit at night, but we have all seen them shining brightly in all key cities of Sri Lanka during daytime. This is sheer wastage by any yardstick. It seems that no one bothers to turn them off the following morning. The idea of designing a new system for the streetlight that do not consume huge amount of electricity and illuminate large areas with the highest intensity of light. Lighting systems in the public sector are still designed according to the old standards reliability and they often do not have advantage of the latest technological development, the use of new technologies for the sources of light and also combination of artificial intelligence system, with the use of LED technology, it is the best solution since it offers benefits like power saving and long life. Street light control system is a centralized system which control and monitor status of the individual street lamp. Lights are switched to ON/OFF automatically based on sunlight.

Author Keywords

Intelligent Street Light, Image Processing, Micro Controller, LED, Gray Scale

Introduction

Electricity is very costly to produce, especially in a country such as Sri Lanka which depends heavily on thermal power generation at the moment. This may ease with the operationalization of more power plants in the near future, but right now, it is not an ideal scenario with regard to street lights. After all, street lights account for 150 gigawatt hours of electricity annually. According to (Sundayobserver.lk) "the Ceylon Electricity Board incurs a massive annual loss of Rs 2,673 million on account of the street lights which are not switched off on time. This is a huge sum of money by any standard, which could have been utilized for improving the electricity distribution system especially in rural areas. Street lights are needed from around 6.30 p.m. to 5.30 a.m. the following day. On the other hand, we see them 'ON' almost for 24 hours." So there is no proper street light management system by Provincial and Local Councils is a heavy burden to the Exchequer and by extension. According to (Sundaytimes.lk) "Minister of Power and Energy said that out of the 700,000 street lights across the island only 500,000 are legal all other lights are unauthorized. He added, the government is spending Rs. 200 per day to maintain a 250 kilowatts street light. A street lamp is consuming around 150 megawatt hours per month". Colombo Municipal Council spokesman said "A Colombo Municipal Council spokesman said that monitoring the street lighting process was not an `easy task as they have only 59 staff members for the large amount of street lights within the city limits he said at least 84 employees are needed. Sometimes they have to send

vehicles for this job and it is sometimes 9.00 am when they switch off the street lights."
(Lankanewspapers.com).

Draw Backs of Present System

The Ceylon Electricity Board incurs a massive annual loss of Rs 2,673 million on
account of the street lights which are not switched off on time. Street lights are needed
from around 6.30 p.m. to 5.30 a.m. the following day. On the other hand, we see them
'on' almost for 24 hours. Thus the lack of a proper street light management system by
Provincial and Local Councils is a heavy burden to the Exchequer and by extension,
the public. Street lights switched on at night are seen burning during the day too in
many parts of the country. This is mostly due to the lack of an employee assigned to
switch on and off lights. In some instances, there is an employee assigned for this task
but he does not carry it out properly. The government is spending Rs. 200 per day to
maintain a 250 kilowatts street light. A street lamp is consuming around 150 megawatt
hours per month. According to Mr. Perera (Technical officer Electrical,) Dehiwala –Mount
Lavinia Municipal Council, Dehiwala. There are several issues with the current system
and he said Every 10-15 pol is connected to 35Amp switch via lamp wire which is used
specifically for this and they start to switch ON the lights from evening 5.45 pm and they
will start to OFF the light from 5.45am till 9 in the morning. From recently they have
started using LED bulbs in main areas (Galle road) and normal bulbs in all the other
areas. They don't have a specific system or way to monitor whether the lights ON/OFF
or any repairs, if they get a complain regarding only they'll visit that particular area and
ON/OFF the lights or do the repairs.

Proposed Solution

"Intelligent Street Light System" can be considered as one of the main solution. As
we discussed in the literature review there are many systems which is considered as
solution to these problem but all the systems are using sensors, Solar power circuits etc.
but no of the system is integrated with Artificial Intelligence. But my proposed solution is
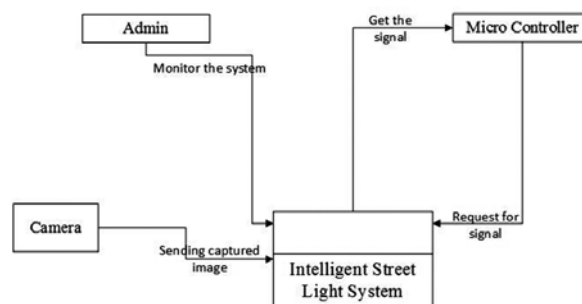
Figure 1 Context Diagram of ISLS

An IP camera will be placed on main polls.(10-15 pols will be connected to a main pol-
this mechanism has been there already) every one hour the camera will capture the
image of the sky(environment) and the captured image will be processed by the image
processing system (where AI will be applied),also the captured image will be saved to

the system at the same time, then in image processing system the captured image will be turn in to gray scale and in here it will find the black value and white value by finding the threshold, for example if the threshold is more than or equal to 60% then the system will sent a signal to the Micro Controller which is also placed on that main poll to switch the light ON if the value is less than 60% light will be OFF if the lights are ON. In case if the lights are OFF then it will remain off until it become more than 60%.

Experimental

This intelligent street light system works independently without human interaction where a camera will be fixed to capture the environment at certain times every hour, so once the image is captured the system will process the image and change into gray scale using MATLAB and the image which is converted in to grayscale will be processed to find the dark(black color level) and based on the results the system sends a signal to micro controller to switch ON the lights, also the same process will be done to switch OFF the light. Illumination of the light will depend upon the darkness that prevail at a time. It can vary depending on weather condition or natural sunset and natural sun rise. The system will capture the image every 15 mints and each day the photos will be cleared.

Captures the image of the sky $\longrightarrow$ change the image into grayscale

$\longrightarrow$ Calculate the black amount (threshold)

given threshold value(m), if the calculated grayscale threshold of an image,

g(i) where g(i) denotes the grayscale threshold function, g(i)> m

the output should yield switch on the lights and vise versa.

Figure 2 out Put

Future Work

The communication Medium

the interconnectivity between the edge device and the central processing unit should be migrated to a wireless medium subsummi9ng basic security principal such as Encryption , given the images captured must be transferred without being subjected to eavesdropping and no loss in quality but with less or minimum resource usage .

The preprocessing of the image

The preprocessing of the images being done at edge devices – the conversion to grayscale – yielding a less file size and there for minimizing the overall bandwidth consumed for transmission. Subsequently it will also minimize the resource usage at the central processing station resulting maximized load handle. At most this shall be attained utilizing a microprocessor/ mote instead of the micro controller. Thereupon, allowing to monitor and control edge devices selectively.

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Minimizing Security Vulnerabilities using Router Technologies in a Computer Network

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Abstract

Router technologies gives numerous preferences; however, it likewise combined with new security threats and adjusts the network's general data security profile. Despite that, usage of different mechanical arrangements is the typical reaction to network security threats and vulnerabilities. Security of a network is an administration concern. Powerful administration of the threats related with router technology requires a mechanism for improved methodology to identify threats. For instance, since communication happens "through the air" utilizing radio frequencies, the hazard of block attempt is more remarkable with wired systems. In the event that the message is not encrypted, or encrypted with a feeble calculation, the hacker can read it, in this way trading off secrecy. Despite the fact that remote systems administration changes the threats related with different threats to security.

Author Keywords

Router technologies, Network Security, Wired Network, Privacy

Introduction

A less secure device will show a simple route for a hacker to demolish the network. In this paper, mainly discover how safely the user associate with the Wi-Fi. The results of this exploration will permit users, likewise of other comparable systems plan better security systems to counter current risks that may rise misusing in Wi-Fi systems. Several security vulnerabilities in user and independent company class switches and demonstrate to keep them secure in system, the general security targets continue as before similarly as with systems: saving classification, guaranteeing, and keeping up accessibility of the data and data systems. Here, the available methodologies are comprehended and surveyed for the different threats related with the utilization of router technology.

Experimental

The chosen routers were tested for evaluation. All the routers were tested in default factory settings. The following table lists the routers along with their default IP addresses and default credentials

Router Model	Default IP address	Default Username	Default Password
Huawei B310s	192.168.8.1	user	user
ZTE ZXHN H108L	192.168.1.1	admin	admin
Dlink DSL-2750U-Etisalat	192.168.1.1	admin	admin

01. Change Default Administrator Settings
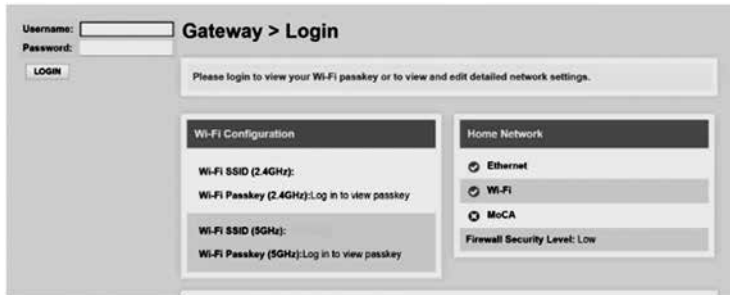
Broadband devices already preconfigured webserver and webpages. Therefore, the login window prompt for an authentication to identify the authorized people to secure connection to the network. However, default logins very simple to identify by hackers. These settings need to be changed immediately.

If an unauthorized user gets his hand on your personal computer it is very easy for him to find the IP address of the router using the command prompt and the ipconfig command.

If the default credentials of the router have not been changed, by simply entering the IP address of the router in a browser takes the unauthorized user to the control panel of the router using the default username and the default password.

02. Change the default SSID

Knowing the SSID is very easy to break into your network, even when someone sees the default ID means, they can attack your network.

03. Disable SSID Broadcast

The router usually broadcast SSID over the air regularly, where clients may connect in to the network. Disabling this feature will protect the system perfectly.

The router can be made more secure by declaring the router as a hidden network after the SSID has been changed thus, an unauthorized user has to first know the SSID of the router before being able hack the password.
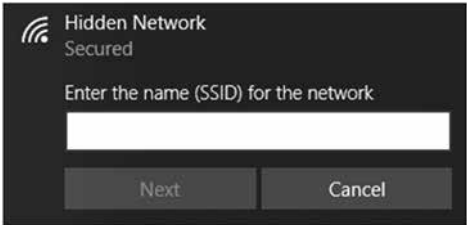
04. Enable MAC Address filtering

Routers always keep a record of MAC addresses of devices, which connected to them. Enabling this security feature is a next step of safeguard to the network because after the MAC Address has been filtered, only the users' whose device MAC address has been allowed can connect to the router.

Thus, even if an unauthorized user knows the SSID and the password would still not able to connect to the router because their MAC address has not been included as an allowed MAC address.

Most users do not understand the necessity of using these most secure in-built router technologies. These in-built security services of the router allow to avoid most of the vulnerabilities. By this research, I suggest by using these router technologies the vulnerabilities can be minimized because it reduces the capabilities that a hacker can gain access to the network.

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Route Traffic Signal Controlling Using Congestion Based On Analyzing Traffic Density

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Abstract

In modern life traffic congestion is considered to be one of the biggest problems in metropolitan environments and it becomes more serious day by day. It is said, the high volume of vehicles, the poor infrastructure of roads development are main reasons for increasing traffic jam. It can lead to drivers becoming frustrated and engaging in road rage. Currently, the traffic light system has been used with fixed time concept for each side of the junctions which cannot be varied as per varying traffic density. As a solution, a fast real time and robust automatic vision based traffic sign detection and recognition can support to avoid congestion in traffic by includes available video cameras in efficient way for effective traffic congestion estimation. According to the image sequences it can measure the density of each roads using image processing technique. It allows to change the signal timing automatically rendering to the higher density by sensing traffic density at the junctions. As a center part of a nation the Kandy to Katugasthota traffic jam area was selected as field location to this study. During the period of three months, the survey was conducted within peak time of morning 6:30am-8:30am and evening 4:30pm-7:30pm. Based on survey evaluation results, the 95% of drivers felt better performance with accuracy and efficiency than existing systems. Mainly, this research fully focused on developing a density based dynamic traffic control signal light by considering the density of traffic.

Author Keywords

Traffic Congestion, Image Sequences, Image Processing, Grayscale Image, Threshold Image, Traffic Density, Traffic Light System

Introduction

In today's high speed life, traffic congestion is a severe problem in most cities across the world and therefore it is time to shift fixed timer mode to an automated system with decision making capabilities. This intelligent system can be used to observe and record information relating to the real condition or the real situation in traffic congestion. This paper focus on emerging concern on traffic congestion in Sri Lanka. Mainly the objective of this paper is, collecting all the image from four-way junction, according to the detected density it has to send the commend to appropriate signal light, system should able to analyze the image in various light conditions. For this study the Kandy to Katugasthota traffic congestion area was selected as a field location. Because it is a hub of Kandy entry for all the vehicles which comes from Kurunegala, Jaffna, Anuradapura, Polonnaruwa, Putlam even Colombo. In order to carry out the investigation, a quantitative research methodology was adopted to find the numeric values and to find their personal opinions. The target population of this research were all passengers who traveled to Kandy by passing Katugasthota Bridge. All the data was collected and analyzed accordingly, in

order to measure the level of effectiveness of intelligent traffic control and to identify the factors that affects through current fixed time traffic light system.

Methodology
Below figure [1] shows the process of measuring vehicle density.
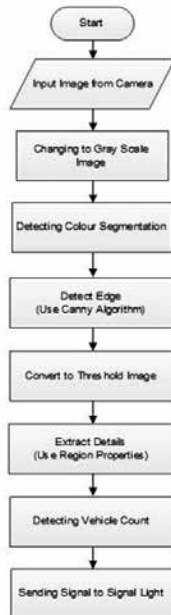
Figure 1 Process of Measuring Vehicle Density

Experimental
Below figures shows the real environment test results.

Figure 2 Real Environment Capture

Figure 3 One Side of the Road

Figure 4 Grayscale
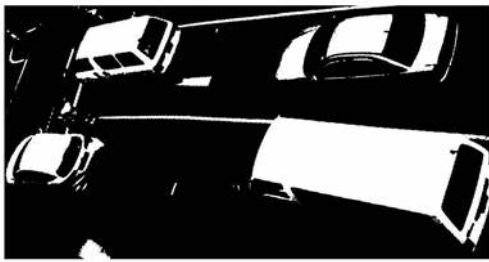
Figure 5 RGB Segmentation

Figure 6 Threshold Image
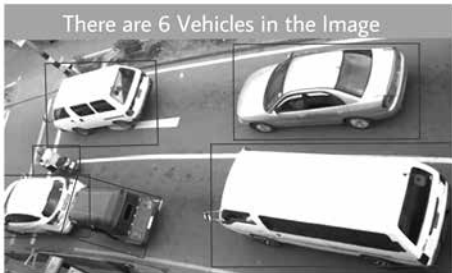
Figure 7 Output of Density Calculation

The survey was conducted through passengers in the field location in order to check the efficiency of this system

The test was done for 3 months of survey period of 12 weeks consequently 50 passengers were chosen through per week. Since survey was conducted among the drivers during peak time of Katugasthota Bridge with limited data. Therefore, responses were gathered randomly total of 600 passengers were represented the whole population of drivers and passengers that travel through Katugasthota bridge. There are core five attributes includes such as morning and evening peek time travelers, frequent travelers, overall average travelers, effectiveness of intelligent system. Based on this real time survey statement of local passengers it's resulting there are 475 were peak hour's traveler, from that 413 were frequent travelers. The study of survey transparent correctly 95% travelers those who felt this intelligent system is efficiency. Below graph shows the summarized survey results.
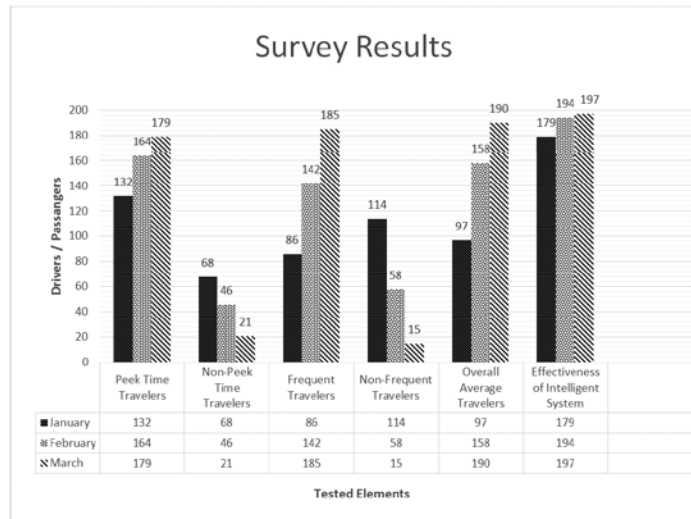
Figure 8 Survey Results

Conclusion

Based on above summarized survey results evaluation shows, this modernized way of controlling traffic is needed those who getting stranded in between heavy traffic. According to the given methodology concept has modified until to reach the density count. Though it is a one-time investment cost, however the identification of traffic signs with respect to various natural background viewing conditions still remains challenging tasks. Because of that vehicle colours become too dark during the night time with the low light. While testing this kind of a situation the algorithm cannot detects the vehicles to find the count. When it's come to the big vehicles Such as container track, container lorry, bulldozer and bego truck which contain two parts like front part and back part this algorithm starts to counting as two vehicles. When there was a vehicle carrying tracks the algorithm starting to count all the vehicles in that track. In the future, testing these type of situation the algorithm should updated to detect the vehicles to find the count. Then simply it controls traffic lights in whole city through a fixed camera. This research is a replica of a four-way lane crossing of real time scenario. Further by considering above mentioned situations, in the future if the intelligent system works successfully it leads to terminate all other traffic systems from the environment.

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Futuristic Communication System for Elderly People (Futurcon)

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Abstract

Foremost purpose of creating this device is to make the elderly people to communicate with people effortlessly with this device. This project will cover calling and SMS system only for the people whose contact details are been saved already in the system. The system made for the user to make it easy by starts with just with a simple touch where it makes the call and SMS. Furthermore, this system will work with more working facilities by touching the touch sensor which is implemented in the system.

Author Keywords

Simple communication, SMS and Calling, touch system, waterproof, portable and reliable.

Introduction

As some people in this world find difficulties in communicating to people through communication medium like mobile phones and other devices. The major issue is that, they might not have a technological background to operate the devices because, for example nowadays mobile phones, getting a simple call they need to come through with lot of process like unlocking the security code or password from the mobile and dial the numbers, find the person details from the contact list and then get the call, so most of them does not know how to operate the mobile phone and if they have a mobile phone even though they find difficult to call, the call might go to another person and it faces a lot of problem. To solve some of the problems like that, this system is to the people like them who faces lot of problem when it comes to communication side.

So, this project will cover calling and SMS system only for the people whose contact details are been saved already in the system where, there is no chance of getting to a wrong call or wrong number. The system is made for the users to make it easy by starts with just with a simple touch where it makes the call and SMS. Furthermore, this system will work with more working facilities by touching the touch sensor which is implemented in the system.

Methodology

This device can be operated through buttons instead of touch sensor, but It has implemented for two reasons one is for security that the touch sensor will work only for the human skin temperature where it differs to many human skins and the other one is to make the customer easy by touching it where there will be no much effort is being given for usage.

Experimental

Nowadays elderly people are facing the problem to communicate to the people when

they are alone at home so to solve these types of issue this system can be a solution for it. Because

I faced at my home leaving my grandmother alone when there is a critical time leaving the home but I cannot leave them because I cannot guarantee what will happen when we leave them at home and they do not have any device to contact when they need the support.

So, we cannot leave them alone by giving a mobile for them, because they do not know how to operate a mobile which makes a complicated process to make a call and send a SMS by unlocking the mobile and so on. So, by looking the overall problem I have come up with this simple calling and SMS device which make the user easy by touching the touch plates which are pasted with the particular caller's image which helps the user to choose the specific person to call.

And also I have connected a speaker as well as a MIC instead of a receiver to hear and talk as they wish.

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Effective Analysis for using anti-virus software's on Windows Operating System

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Abstract

This research demonstrates the effective analysis of anti- virus software's on Windows Operating System by comparing them that is available in market. Because There is an ongoing battle between the creators of computer viruses and malicious code and there for the cooperation's creating antivirus software to prevent their actions. While antivirus firms are adding proactive technology to their antivirus software, still the virus and malware attacks are ruling. So in this research a test was done within computer lab by installing top 5 anti-viruses with windows defender and analyzed their effective analysis by their performances, functionality, help & support and startup time and maintained about 40 days. This paper specifies the performance of (MacAfee, Windows defender, Avast, Bitdefender, Kaspersky) antivirus and its effective on the computer. By this effective analysis the best antivirus software tool was found because of its stunning performance, useful features, responsive support and a gratifying user experience.

Author Keywords

Exploit, cybercriminals, fraud

Introduction

Computer security is the protection of information systems against theft or damage to hardware and software. During the time that computers have existed and will be available, regardless of whether they are connected to the Internet or not, Antivirus software will always be required. There will never be a time when people, whether they are mischievous youngsters for thrills or hardened cybercriminals trying to exploit multi-billion dollar companies, youngsters will start looking for ways to commit fraud, cause widespread damage or just experience the rush to break a computer in this case Antivirus software is an important tool to help prevent such attacks. When trying to buy Antivirus software, be sure to purchase a reliable and known subscription program. Antivirus software plays an active role towards the prevention of hidden threats in web which can affect the computer. The infection can be of different types such as Droppers, Trojans, root-kits, worms, viruses, and so on. Antivirus is security software that focuses on providing better protection. Antivirus software is designed to handle all types of malicious loads that attack from reliable and unreliable sources. Even though there are many anti-virus software's the growth of virus attacks are high. Because we don't know the effective of anti-virus software's. This study shows the effective of top 5 anti-virus software's by testing the performance, startup time, features, help & support and overall rating. So readers would understand the effective of anti-viruses and this study shows the top 5 Antivirus software tools and give the best tool based on various parameters.

Experimental

For this research anti-viruses are being tested. The anti-viruses which are tested are Avast, Kaspersky, Bitdefender, McAfee and the Windows Defender which is an integrated security system well integrated into the operating system. So no need of installation. So the other anti-viruses were installed in many computers and tested their performance, startup time, functionality, help & support and overall rating. In the test the functionality was tested based on real time scanning, manual scan, firewall protection, web protection and live update. The performance was tested based on the following activities: file copying, archiving / unarchiving, installing / uninstalling applications, launching applications, downloading files and by Browsing websites. The help & support was tested based on their call support, chat support, email support, technical support and installation and configuring assistance. And the tests were performed on a clean 64-bit Windows 10 system then with the anti-virus software put in (with default settings) and tested about 40 days. The tests were performed with an active internet connection to allow the impact within the world of services. Several files were simulated for operations that a computer user could perform: copying different types of clean files from one place to another, downloading files from the Internet, and opening applications (open documents). About 3 GB of data used for consisting of various types and sizes of files (images, movies, audio files, MS Office documents, PDF documents, applications / executables, files of the Windows operating system, files, etc.) and some costs were gone to buy some anti-viruses. On the test some computers performance and functionality became low on the 30th day reason their free trial version has expired and outdated. On the 31st day some files had been downloaded through the internet and shared among the computers and some computers were being affected by some Trojans and malwares. While browsing the internet founded that An AV-test was conducted by Microsoft in that AV-test says the windows defender, Avast, bit defender, Kaspersky and McAfee had taken top score of 17.5 points out of 18. (Jones, 2018)

This table 1 shows the following results gathered by testing from the computer lab.

The following Figure-1 is the graphical representation of overall rating detail in Table-1.

Anti-Viruses	Performance	Functionality	Help & Support	Startup-Time	Overall Rating
Bit defender	8.9	9.1	8.5	32.3 second	9
Avast	8.3	8.5	9.1	44.3 second	9.5
Kaspersky	9.1	6.9	8.3	41.9 second	9
McAfee	8.9	8.1	8.9	28.1 second	9.1
Windows Defender	9.3	8.9	8.9	20.2 second	9.7

Figure-1
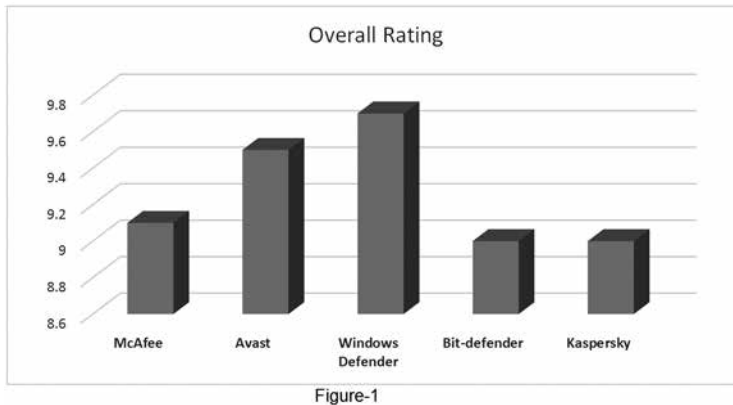
Conclusion

These antivirus software options include similar features such as real time scanning, email security and USB drive scans. In this analysis performance wise and startup time windows defender is the best, features wise Bit defender is the best and help and support wise Avast is the best antivirus tools. In overall ratting by the test Windows defender is the best antivirus software tool because of its stunning performance, useful features, responsive support and a gratifying user experience.

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How far the awareness of Calorie consumption of an individual leads to maintain a healthy body

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Abstract

Calorie consumption is an important fact that leads for a healthy life. More calorie consumption per day leads to make us over weight or obesity. Lack of any idea about the daily consumption of calorie is a main problem face by all of us when considering the obesity. And also we may be not having any idea about the calorie burning rate in our daily routine. If we all have an effective user friendly method to track the calorie consumption and alerting method of our food consumption, our lives will be smarter than now.

This research is on keeping us healthy by tracking and alerting us about the calorie consumption just by taking a photo of the meal by a mobile device. After processing the image taken by the device-camera, food can be detected automatically and amount of food can be entered as taken. Then program itself detects the calorie intake by an individual of the whole day and calorie burning amount is calculated by inserting daily routine to the program. Trustworthy daily routine tracking has been taken from available apps like "Steps"," Health"etc.

As final result of this research it has proved that having awareness about the daily calorie consumption, has leaded people to maintain the proper body calorie content by burning unwanted calorie which leads for maintaining a healthy body.

Author keywords

Calorie consumption, obesity, food patterns, food detection, image processing, calorie burning, healthy body.

Introduction

Globally obesity has become a severe health problem that leads for many diseases like heart disease, diabetes, liver disease and numerous sorts of cancers. Not only adults but children also have become the victim of this obesity. According to a survey done, it has been published that, global annual medical cost of treating obesity-related diseases is expected to reach US$1.2 trillion per year by 2025. [1]This data implies how far this obesity has engulfed our valuable lives. Main reasons behind this are foods that we take and lack of exercises.

When it comes to foods, we may take high calorie foods with or without our knowledge. Though we know that some foods are not healthy, we take those due to our busy lives may be due to the addicted taste. But if we have an awareness or alerting of daily consumption of calorie, we will be automatically adapted to control our food pattern.

This body calorie level can be minimized by daily exercises or by boosting metabolic activities. Sometime, though we take bit high calorie level, due to the exercise we do

calorie level can be maintained. Hence if we have an idea about daily calorie-burn then it will be easier for us to control and maintain our food pattern. And here it has considered BMR (Basal Metabolic Rate) value calculated by Mifflin-St Jeor equation which gives the calorie amount needed for an individual for a day under sedentary condition which means under less or no exercises condition [4]

This research is about facilitating us in knowing and alerting on daily calorie that we take and burn. Here the main aim is to gifting a healthy society to the world.

Present Systems and Drawbacks
There are some applications which can auto detect food items and suggest calorie amount of food items. But there some drawbacks can be identified as follows,

• Actual portion of the food amount is not suggesting correctly,
• Food suggestions are not correct and there is no method to the system to self-learn.
• Limited suggestions are given for Srilankan foods.
• Only calorie consumption is calculated without considering the calorie burning rate, which lead to give wrong idea for food control of an individual.

Methodology
In-taken food and amount of food can be fed to this application or else once the image of the in-taken food is captured, the calorie amount and the volume can be suggested by this application. Food detection and mass detection of the food has been done by image processing and calorie amount of the food is calculated as shown below with the help of a calorie table already stored in the system database.

1.Image is captured	2.Captured image is processed (Image Processing)	3.Calorie of the image is calculated
•By Camera	•Clustered image •Gray scale •Image is filtered.(median filter) •Contrast image •Edge detection(Canny ditetctor) •Binary image.(Thresholding) •Segmented image. •Feature extraction. •Shape is detected. •Volume is detected.	•Calorie in the image= $\bullet$ $\dfrac{Calorie\ in\ the\ table \times Mass\ of\ the\ image}{Mass\ from\ the\ table}$ $= \dfrac{105 \times 90}{100}$

Example

Food	Weight(grams)	Calorie
Banana	100	105

Experimental
It could found that awareness of calorie intake per month (Average daily calorie intake) leads to maintain calorie content of an individual. And it has found that this generation has no any idea of reducing their calorie intake but they have at least tends to engage in more exercises. Following data has been taken from ten male individuals to check how their average daily calorie consumption without this application and with this application. In first month average daily calorie intake has been calculated without application and other five months have been tested with this application. Calorie burnt mentioned below has taken from the app "Heath" or "Steps".

No of Participants			10	
Gender			Male	
Person #	Height(feet)	Weight(kg)	Age(Years)	BMR(Calorie)
1	5.9	78	25	2106
2	5.8	75	26	2045
3	6.0	79	28	2158
4	6.2	80	29	2202
5	5.7	62	27	1864
6	5.8	70	27	1979
7	6.0	75	28	2110
8	6.0	78	29	2140
9	5.9	80	27	2118
10	5.8	76	26	2057

	Month 1		Month 2		Month 3		Month 4		Month 5		Month 6	
	intake	burnt	intake	burnt	intake	burnt	intake	burnt	intake	burnt	intake	burnt
Person1	2017	-	2118	132	2228	124	2118	135	2128	132	2218	121
Person2	2046	-	2150	121	1941	135	2155	132	2046	125	1987	125
Person3	1927	-	1942	110	2274	121	2158	125	2158	121	2016	126
Person4	2422	-	2358	141	2469	216	2422	276	2643	250	2422	258
Person5	1492	-	1865	141	2051	136	1992	140	1678	132	1890	132
Person6	1980	-	2176	210	1980	212	2178	210	1782	205	2176	213
Person7	2532	-	2321	143	2270	165	2321	246	2326	256	2321	224
Person8	2354	-	2568	136	2140	141	2140	141	2172	142	2153	136
Person9	2331	-	2119	121	2543	125	2335	132	2119	132	2336	135
Person 10	2264	-	2469	233	2321	235	2246	233	2358	235	2272	232

Calorie Consumption
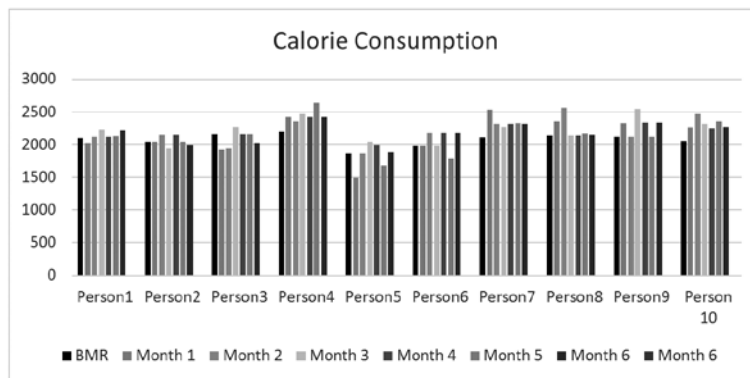
It could find from above analysis that those who have less calorie consumption than the BMR (person 5, 3) have used to intake more calorie in order to maintain their calorie. But those who have high calorie consumption have not decreased their calorie consumption (person 4, 7) throughout this 6 months. But from the analysis of calories burnt, it can get the idea that some people have (person 4, 7) intended to do exercise like walking or running to burn their daily calorie intake while others have no much interest about exercises except person 10.

Calorie Burnt
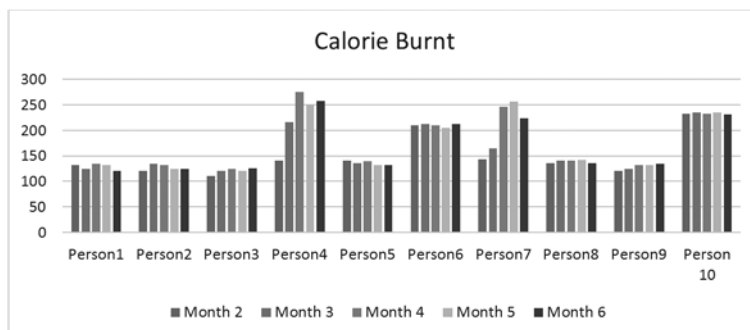
Conclusion

From the analysis done above it can be identify that if somebody has an awareness about the calorie consumption rate, there is a possibility to maintain calorie intake as the needed amount. But with this research it could not find that people who take more calorie which is beyond the limit have not reduced their calorie consumption, but instead they have engaged in more exercises than usual. Any how it can be conclude that having awareness about the daily calorie consumption leads to gift a healthy body.

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Application of 'Machine Learning Technique' in Pharmaceutical Drug Stock Simulation

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Abstract

Pharmaceutical industry is an important component of health care systems throughout the world and is identified as a vast growing segment in Sri Lanka. Globally the development of pharmerging markets is certainly large whereas Sri Lanka is still at a nascent stage contributing less than 15% of the requirement.

A key KPI in this sector is 'Maintaining a sufficient stock with accurate prediction' of items, where some limitations are identified due to the fact that the prediction on requirement of pharmaceuticals is based on stock keeper's records, assumptions by general practitioners etc. As the stock-decisions are irreversible, wastage of drugs and subsequent loss of revenue are unavoidable, the costs borne by the patients is often subjecting to intensification, despite the facts that the patients could experience free health care services in the public sector, patients may still may have to spend out of pocket for some drugs when they are not readily available.

Not all the medicines are imported by the state sector whereas they purchase by private importers based on the Cost, Insurance, and Freight (CIF) value which is always vulnerable since this is not independently scrutinized for the markups. The above constraints of wastage of drugs and cost factors are the main loopholes which has drawn the attention of the researcher, notwithstanding the following alternatives adhered by the state sector.

State sector's governance on Medicine Supply and Accessibility through the State Pharmaceutical Corporation (SPC). Practices such as government renovating prices for Noncommunicable Diseases (NCDs) such as high blood pressure, heart diseases, cancers, traumatic injuries and diabetes by a gazette issued in October 2016, for 48 essential medicines. Analysis of Sri Lanka's pharmaceutical price control mechanisms by the National Medicine Regulatory Authority (NMRA) and so forth.

Thus, the research concept would explicit a computer based predicting model by Machine Learning as an attempt to eliminate the drawbacks mentioned analysing massive quantities of data sets such as stock amount, demography and temperature. Initially, a dummy function would be created considering the above data as the training set. Eventually a best prediction function / hypothesis would be obtained after series of steps followed by Iterative adjustment and gradient descent algorithms using polynomial regression as a mathematical tool in order to introduce a more efficient and a reliable drug simulation method which is still untapped in Sri Lanka.

Introduction
Pharmaceutical industry is an evolving market component and a vast developing segment in health care systems which is being subjected to constant discovery and development of drugs based on scientific research and development (R&D), technological advancements, toxicological and clinical experience, socio-demographic characteristics, drug attributes, industry scientists, public advocacy groups, prescribing habits, Government policies, environmental factors etc. According to World Health Organization 'responsible use of medicines' is anticipated in order to minimise negative health effects. As a way to achieve the same, minimization of irrational use of medicines could be identified as overuse, underuse or misuse which leads to wastage of resources. Thus, the researcher's has created a hypothesis to determine the amount of Pyloocain Ointment needed as a concentrated solution which could be developed and applied to a greater extent, utilizing Machine learning as a tool of achieving Artificial Intelligence.

Machine learning allows computers to recognize complex data patterns and helps in predicting and forecasting without explicitly being programmed and automates analytical model building. With this technique the computer can be fed with data which has desired outputs or even with some targeted outputs missing.

Thereby the computer itself learns and finds the function that best describes the output hypothesis considering model relationships and dependencies between the target prediction output and the input features considering past experiences besides. Supervised learning was the type of algorithm which was exercised and the initial function or hypothesis was first built including input variables ($x_{(n)}$), output variable $h_0(x)$ and the parameters $\theta_{(n)}$.) where all the data which was fed into the system were known.

Experimental
The key principle of the research idea was to find out the optimum function that best describes the amount of drug stock to be maintained. The steps followed could be stated as follows.
• Fragmentation of data set
• Normalizing data
• Selection of the hypothesis
• Training the hypothesis
• Obtaining the best fitted model

First the gathered data was divided into 2 sets as training set and test set into 5:1 ratio. Then out of the training set 90% of data was selected as actual training set where 10% of the training set was selected to validate the model. Training set is used to train the model where the model could see this data and learn from this data to fit the model. Validation set is used to evaluate the model and to fine tune the model hyperparameters. Once the model is completely trained with training set and validation set, test set is used to check the accuracy of the model. The data was normalized as the next step. This was

done to rescale the data which was gathered in different scales with large variations.

Out of variety of factors affecting the determination of the drug stock following were the input variables.

x_1 - Year

x_2 - Temperature (^0C)

x_3 - Pyloocain Ointment (Betamethasone Valerate 0.5mg + Pheylephrine Hydrochloride 1 mg + Lidocaine Hydroxide 25mg in 1g Ointment) 30g / pack.

x_4 - Live births

x_5 - Deaths

Year	Temperature	Drug Stock Qty(Packs)	Live births	Deaths
x^1	x^2	x^3	x^4	x^5
2013/2014	27.3	16562	365 792	127 124
2014/2015	27.4	18750	349 715	127 758
2015/2016	27.5	29230	334 821	131 634
2016/2017	27.8	37786	331 073	130 765
2017/2018	27.9	43856	326 052	139 822

Table 1- inputs for the training examples

Then the below was selected as the hypothesis.

$$h_0(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3 + \theta_4 x_4 + \theta_5 x_5 + \theta_0 x_2{}^2 + \theta_1 \theta_2 x_1 + \theta_4 x_2 + \theta_3{}^2\theta_2 x_3$$

A training example can be denoted as follows. (x,y) with known inputs (x) and outputs (y – the actual amount of drug stock used).

$$\underline{x} \quad \begin{Bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{Bmatrix} \qquad y \quad \begin{Bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{Bmatrix}$$

Total of input data could be given by a matrix with m training examples.

$$\underline{x} \quad \begin{bmatrix} x_1{}^{(1)} & x_1{}^{(2)} & x_1{}^{(3)} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & x_1{}^{(m)} \\ x_2{}^{(1)} & x_2{}^{(2)} & x_2{}^{(3)} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & x_2{}^{(m)} \\ x_3{}^{(1)} & x_3{}^{(2)} & x_3{}^{(3)} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & x_3{}^{(m)} \\ x_4{}^{(1)} & x_4{}^{(2)} & x_4{}^{(3)} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & x_4{}^{(m)} \\ x_5{}^{(1)} & x_5{}^{(2)} & x_5{}^{(3)} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & x_5{}^{(m)} \end{bmatrix}$$

At first the initial function was being trained using training examples initializing with zeros. At each iteration time the parameters θ_n of the function were repeatedly being updated and it was assumed that the last updated model was precise.

The accuracy of the function obtained was being checked for θ_n. In this phase too we were utilizing known input and output variables recognized as the test set. A well fitted hypothesis was obtained with optimum θ values with a simplified hypothesis considering all the m training examples at each iteration. According to the updated θ values after all the iterations the optimum hypothesis was obtained. The algorithm utilized was Gradient Descent which requires a cost function. Cost function is used to monitor the error of the hypothesis. The objective of the algorithm was to obtain the minimum cost function. Gradient Descent achieves this lowest error value with calculus as the first derivative of a function gives the gradient and this gradient always points towards the local minima which leads to the determination of minimum error function. The following diagram denotes how the training and validation loss varied with one forward pass and one backward pass of all the training examples which is identified as an epoch.

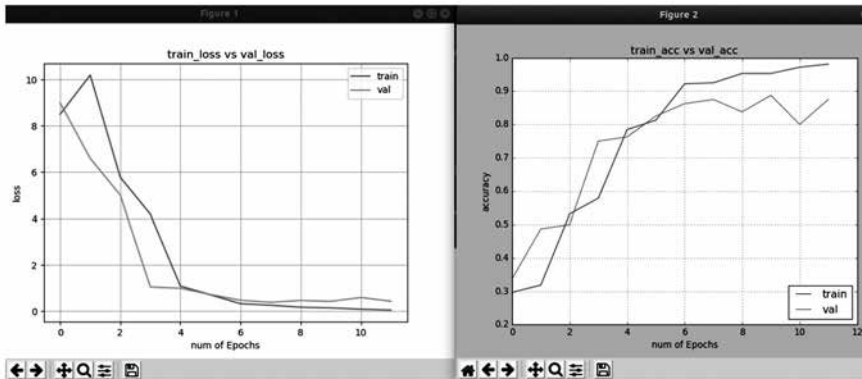Fig 1: training and validation loss/ accuracy against number of epochs.

The Cost function which determines the error is as follows.

$$j(\theta_0,\theta_1) = \frac{1}{2m}\sum_{i=1}^{m}(h_0(x^{(i)}) - (y^{(i)}))^2$$

The formula for Gradient Decent where α is the learning is rate and θ are the parameters to explain.

$$\theta_j := \theta_j - \alpha\frac{\partial}{\partial\theta_j}j(\theta_0,\theta_1)$$

Conclusion

Not only three inputs an accurate model can be further created by carefully identifying influential factors to be considered in determining the drug stock as mentioned in the context. This technique could even be applied not only for a specific generic but for different brands of the generic. For instance if we consider the generic Metformin different models can be created for the brands Glucophage, Glucophage XR, Glumetza, and Riomet, Fortamet with exactly the same method. It is just a matter of finding the data of the past records where no implantation cost is required at all. Thus, the researcher has attended to a concentrated solution to minimise the wastage and consequences such as drug poisoning, wastage etc. as an attempt of assisting in increasing patient compliance more effectively contributing in drug selection and placing orders which have been identified as key roles in drug stock maintainers.

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Anti-fungal activity of Betel leaf extract against stem-end rot disease of papaya during cold storage

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Abstract

Post-harvest losses of papaya due to the fungal diseases is a major constraint in papaya production and supply chain in Malaysia and worldwide. Stem-end rot an important postharvest disease in papaya is caused by Lasiodiplodia theobromae (synonym Botryodiplodia theobromae). No specific control measures have been developed for this disease but field sprays with systemic and contact fungicides could reduce field inoculum levels and reduce disease incidence. Moreover, due to developed resistance in pathogen and health concerns, there is a great demand to find alternatives to synthetic fungicides. Betel leaves, Piper betle L., widely available in Malaysia and in Asian region, has been known for its antifungal and antimicrobial activities due to its chemical constituents. The aim of this study was to evaluate the in vitro efficacy of Betel Leaf Extract against L. theobromae. The pathogen was isolated from diseased papaya fruits according to Koch's postulates. The pure culture of pathogen was maintained on PDA medium and identified as Lasiodiplodia theobromae (CABI- IMI number: 506609). Two crude extracts were used for this research, Betel leaf extract in propylene glycol and Betel leaf ethanol extract. Different concentration (6%, 8%, 10%, and 12%) of each of these Betel Leaf extracts, were tested for their antagonistic potential against L. theobromae. Maximum inhibition in radial mycelia growth 98.48% and 93.67% of L. theobromae was observed in 12% Betel leaf ethanol extract and 12% Betel leaf propylene glycol extract respectively, as compared to the control. The results of Scanning Electron Microscopy (SEM) images showed disruption and distortion of fungal mycelium and fungal conidial spores grown in the both types of Betel leaf extract.

Author keywords
Antagonistic, antifungal activity, postharvest diseases, Betel leaf extract

Introduction
Papaya (Carica papaya L.) fruit in the family Caricaceae, has a high demand due to its affordable price as well as its nutrient value such as vitamin A, C, minerals, fibers and dietary antioxidants such as Beta-carotene, B-cryptoxanthin and Lycopene (Rivera-Pastrana et al., 2010). Even though it is a native of tropical America, is growing as a commercial fruit crop in many tropical and sub-tropical regions around the world (Bautista-Baños et al., 2013). In Malaysia, papaya, 'sekaki' is the leading cultivar for domestic consumption and export market, where Hong Kong is the major export destination followed by Singapore, United Arab Emirates and Brunei (Rahman, 2008).

Since the nature of rapid ripening and softening which limits the storage, handling and transport potential of papaya (Ravneel Prasad, 2015), it has a high percentage of postharvest losses combine with diseases by micro-organisms, specially fungi.

According to Alvarez and Nishijima (1987), papaya postharvest losses due to diseases is ranged from one to 93% depending on postharvest handling and packing procedure. A research with 'sekaki' variety in Malaysia, showed that among the diseases the highest disease incidence and severity were recorded for anthracnose caused by Colletotrichum gloeosporioides, followed by stem-end rot caused by Lasiodiplodia theobromae (Rahman, 2008). Netto et al.(2014) mentioned that disease incidence of stem-end rot which is caused by fungi, L. theobromae can reach around 70-80%, with a resulting reduction in commercial value of the fruit.

L theobromae invade the severed peduncle after harvest as well as spores may invade through crevices between the peduncle and the papaya flesh or invade through small wounds that occur at the harvest and cause stem-end-rot disease (Alvarez and Nishijima, 1987). Lasiodiplodia theobromae species are common in tropical and subtropical regions and they cause a variety of diseases in up to 500 plant hosts where several economically important crops, especially avocado, banana, cashew, citrus, mango, rambutan, soursop, passion fruit, guava, water melon and coconut palm (Netto et al., 2014a).

Traditionally control of papaya postharvest fungal diseases depends on a series of chemical fungicides, where two most common fungicides, thiabendazole and benomyl control the disease up to 50% (Hewajulige & Wilson, 2010). However, prolonged application of single fungicide on fresh fruits and vegetables may lead to development of resistant strains and reduce the effectiveness of fungicide against the target organisms. At the same time due to the carcinogenicity, long degradation time and high residual toxicity which harm to consumers' health and environment (A. Ali, Hei, & Keat, 2016).

The utilization of natural products, especially the plant extracts, has been shown to be effective against many plant pathogens and considered to be safe for consumers and environments (Bussaman et al., 2012). Piper betel, a member of the Piperaceae, is one of the invaluable medicinal plants where its leaves have been used for many medicinal purposes (Guha, 2006). P.betel, 'Betel' leaves contain a wide variety of biologically active compounds, which are responsible for its antioxidant, antifungal, antibacterial and chemo preventive activity (I. Ali et al., 2010a). The aim of the current work is to find out the effect of Betel leaf extract to control the growth of stem-end rot pathogens in papaya and to apply it at a suitable concentration to inhibit the spore germination and mycelial growth of the pathogen.

Experimental

Symptomatic tissues (1 cm2) from the skin of papaya were surface-sterilized using 1% sodium hypochlorite for 3 min, followed by three washes with purified water and drying on sterile paper. The edges of the surface-sterilized tissues were cut off and the tissues were cultured on Petri dishes containing potato dextrose agar (PDA) and incubated at room temperature (26+02C). Once mycelial growth was observed, the colonies were re-isolated on fresh PDA dishes to obtain pure cultures. The isolates obtained were then identified based on their morphological and cultural characters. Re-isolations were carried out continuously on PDA slants to maintain inoculum. Two slants of inoculum were sent to CABI (Microbial Identification Service), UK for molecular identification.

PDA plates were amended with different concentrations (6%, 8%, 10% and 12%) of

two types of original Betel leaf extracts, separately. One was Betel leaf ethanolic extract and other one was Betel leaf extract in propylene glycol. The "poison food technique" (Sivakumar et al., 2002) was carried out to evaluate antifungal activity of Betel leaf extract on the inhibition in radial mycelial growth of Lasiodiplodia theobromae on PDA medium. The petri dishes were incubated at room temperature (26+02C) and radial mycelial growth was assessed every two days until the mycelium in control dishes reached the edge of the plate. The effect of the treatments was assessed by comparing growth(mm) of the fungal mycelium and the percentage inhibition in radial mycelial growth (PIRG) was calculated using formula described by Al-Hetar et al.(2011).

In vitro spore germination inhibition test was performed following the method of A. Ali et al. (2016). Using a sterile, bent glass rod, 0.5ml of spore suspension of L. theobromae (500 spores per plate) were spread on the PDA plates with each treatment. For control dishes contained PDA only. After 24h, the number of germinated spores was counted in 10 microscopic fields of 100 spores in 20 replicated plates under a light microscope at 10× magnification. Percentage of inhibition in germination was calculated by the method of Cronin et al. (1996).

PDA plates were amended with different concentrations of both types of Betel leaf extracts for inoculate conidial spores and mycelium plugs separately. The mycelium plugs were incubated for 6 days and spores were incubated for 2 days at room temperature (26+02C). A thin layer of 0.8cm2 squares of PDA with conidial spores and PDA with mycelium were cut off separately from each treatment plates and mounted on stubs to get SEM images, immediately, using FEI Quanta 400F, Field Emission Scanning Electron Microscope.

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Comparison of cefoxitin disc diffusion test and PCR for mecA, PVL and femB genes for detection of MRSA

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Abstract

Methicillin resistant Staphylococcus aureus (MRSA) strains emerged soon after the introduction of methicillin into the clinical practice. In recent times, multiple reports claim that cefoxitin can be used as a surrogate marker for detection of mecA gene induced methicillin resistance due to it being a potent inducer of mecA regulatory system. The aim of the study was to evaluate the efficacy of cefoxitin disk diffusion test to detect methicillin resistance in Staphylococcus aureus and compare it with detection of mecA by PCR which is considered as the golden standard. This study also targeted to identify the prevalence of femB and PVL genes in MRSA.

A total of 72 clinical isolates of Staphylococcus aureus were tested in the study. Both the PCR and cefoxitin disk diffusion identified 30 isolates as MRSA. Therefor cefoxitin disk diffusion method was found to have a sensitivity and a specificity of 100% in comparison to PCR. Prevalence of MRSA was found to be 41.66%. The 30 confirmed MRSA isolates were tested for femB and PVL genes where 26 isolates were positive for femB gene and 4 isolates were positive for PVL gene. The prevalence of said genes in MRSA was found to be 86.6% and 13.33% respectively. The study concluded that cefoxitin disk diffusion is comparable to PCR in sensitivity and specificity for detection of MRSA, therefor it can be used as an accurate surrogate marker in the detection of methicillin resistant in Staphylococcus aureus specially in resource constrained settings.

Author Keywords

MRSA, cefoxitin disk diffusion, PCR for mecA, femB, PVL

Introduction

Staphylococcus aureus is a commensal bacterium which is Gram-positive in nature (Jenkins et al., 2015). It's a significantly important bacterium due to its ability cause a range of infections and its ability adapt and survive in different environmental conditions (Grema et al., 2015). Staphylococcus aureus is known for its ability to acquire resistance to antibiotics easily than other bacteria (Chambers and DeLeo, 2009). Multidrug resistant variants of Staphylococcus aureus are now on the rise. Methicillin resistant Staphylococcus aureus (MRSA) strains emerged soon after the introduction of methicillin in to the clinical practice. Strains that possess mecA gene are either heterogeneous or homogenous in their expression of resistance (Anand et al., 2009). One of the main methods to control an outbreak of MRSA is early and accurate detection of the infection.

In recent times, multiple reports claim that cefoxitin can be used as a surrogate marker for detection of mecA gene induced methicillin resistance. This is because cefoxitin is a potent inducer of mecA regulatory system. Clinical and Laboratory Standard Institute (CLSI) recommends the usage of 30μg cefoxitin disc and an inhibition zone diameter of ≤21 mm to be taken as methicillin resistant and ≥22 mm to be methicillin sensitive. The objective of this study was to evaluate the efficacy of cefoxitin disc diffusion test to detect methicillin resistance in Staphylococcus aureus and compare with detection of mecA gene by PCR which is considered as the gold standard (Gunawardena et al., 2012).

Experimental

A total of 72 clinical isolates of Staphylococcus aureus received at the Department of Microbiology, Colombo South Teaching Hospital (CSTH) were included in the study. Confirmation of the isolates were done using standard tests which were Gram stain, catalase and slide/tube coagulase tests, Manitol Salt agar and DNAse agar test. Cefoxitin disc diffusion was performed using 30 μg discand zone sizes were measured. PCR for amplification of the mecA gene was performed. In addition, PCR was performed to detect the PVL and femB genes among the isolates.

Cefoxitin disc diffusion method

All the isolates were subjected to cefoxitin disc diffusion test using a 30 μg disc. A 0.5 McFarland standard suspension of the isolates were made and lawn culture was done on Muller Hinton plate. Plates were incubated at 37 0 C for 18 hour and zone diameters were measured. An inhibition zone diameter of ≤21 mm was reported as cefoxitin resistant and ≥22 mm was considered as cefoxitin sensitive.
Methicillin sensitive S. aureus (MSSA) ATCC 25923 and methicillin resistant S. aureus (MRSA) ATCC 43300 - were used as negative and positive controls respectively for quality control strains.

PCR amplification of the mec A gene, PVL and fem B

DNA extraction was performed by using bacterial DNA extraction kit (CEYGEN Bactospin D TM column based bacterial DNA extraction kit). Two sets of oligonucleotide primers were used to amplify mecA, femB and PVL genes. Primer sequences published by Jonas et al. (2002) and Lina et al. (1999) were employed for the detection of susceptible genes. Multiplex PCR was carried out with 2.5 μl of the extracted DNA in 25 μl of PCR amplification mix consisting of 10x Buffer, 25mM of $MgCl_2$, 2.5U of Taq polymerase, 0.25mM of dNTP, 0.4μM of each primer; mecA1, mecA2, luk PV1 and luk PV2 and 0.5 μM femB1 and femB2. After amplification for 35 cycles (45s of denaturation at 94°C, 45s of annealing at 50°C and 60s of extension at 72°C), the amplicons were resolved by 1.5% agarose gel electrophoresis. Amplicons of 310 bp were consistent with mecA gene amplification, PVL433 bp and femB 651 bp (Figure 1).

Results
Of the 72 isolates, 30 were found to be methicillin resistant by cefoxitin disc diffusion test. In 26 MRSA isolates, mec A gene was detected. PVL gene was detected in 04 isolates. Fem B gene was detected in 24 isolates. Results indicated 100% sensitivity and specificity for both PCR and Cefoxitin disc diffusion for identification of MRSA.

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Survey of Hygiene habits of Urban Sri Lankans in Wellewatte Colombo, and Anti-microbial properties & Safety of popular Hand-Wash/Sanitizer brands

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Abstract

Diarrhea is a common medical condition with mild to severe clinical presentations and multiple causative-factors, commonly being microorganisms. Hygiene is identified as the main preventive measure for microorganism-induced diarrhea, with proper Hand Washing considered vital. Further on there is a vast market of Hand Wash/Sanitizer materials whose effectiveness and safety are uncertain. Therefore the main objective of this project was to determine Hygiene-habits of Sri Lankans of Wellewatte, Colombo through a systematic survey and Anti-microbial properties & Safety of popular Hand-Wash/Sanitizer brands through MIC & ABST testing. It was found that a majority of subjects passed the Awareness & Hygiene scores, used Hand-Wash/Sanitizer brands and regularly washed hands before eating. Further Hand-Wash/Sanitizer brands A,B,C,D respectively were most commonly used. An inversely-correlating relationship between Regular Hand-Washing and Diarrhea-Incidence was overwhelmingly observed. ABST & MIC tests showed Brand-D & Brand-A having best or equal-best performances among Hand-Wash and Hand-Sanitizer brands respectively. Finally brands C, E & F were identified as containing FDA-banned chemicals.

Author Key Words

Diarrhea, Food Poisoning, Hygiene habits, Sri Lanka, Anti-microbial, Hand-Wash/Sanitizer, ABST, MIC

Introduction

Diarrhea is classified as passing ≥3 stools within 24hrs and occurs worldwide with most mild-cases resolving naturally within 2-3 days, while others cases can have moderate or severe/fatal presentations. The Epidemiology Unit has officially recorded 5193 cases of diarrhea in Sri Lanka (154 from Colombo district) in 2017, which is a 54% decrease island-wide (77% in Colombo) from a decade ago, but it is noted that a vast majority of mild to moderate cases go unreported (EPID, 2018). Diarrhea has many causes, most frequently being microorganisms (bacteria & viruses) which release chemicals that induce damage in intestinal-epithelial cells which cause frequent bowel movements (Sweetser, 2012). Diarrhea caused by ingestion of such microorganisms from contaminated hands/utensils/food is termed Food Poisoning (FP), which occurs commonly during food-handling/preparation/transport/storage/consumption and presents with symptoms of vomiting, abdominal-pain, headache and fever within 2-24hrs (NCEZID, 2017a). A majority of such cases in Sri Lanka are reported from large outbreaks in Garment factories & social-gatherings (EPID, 2013).

Severe diarrhea cases require IV-fluids, Anti-motility agents and IV-Antibiotics or Antivirals (Samaranayake and Balasuriya, 2011; DGMQ, 2017). However antibiotic-resistance is

a growing threat making preventive actions more crucial while also negating treatment-costs (Sri Lankan Society for Microbiology, 2016; de silva, et al., 2001).

Studies have shown incidences of FP have very strong-association to preventive-measures such as hygiene, that prevent/reduce contamination with causative agents, with Hand-washing being key (WHO, 2009; NCEZID, 2017b). A variety of Soaps/Hand-Wash/Sanitizer brands are currently used but research shows following proper mechanical-scrubbing & washing-action during Hand Washing is sufficient for prevention (FDA, 2016; Aiello, Larson & Levy, 2007). However limited research exists which explores the relationship between Diarrhea-Incidence & Hygiene-habits among Sri Lankans.

Therefore the main objective of this project was to determine Hygiene habits & popular Hand Wash/Sanitizer brands among Sri Lankans in Wellewatte zone of Colombo-District via a Questionnaire, and an assessment of the anti-microbial activity of these brands on standard E.coli-cultures (a typical diarrhea-inducing test-bacteria) (Raho and Benali, 2012). Further an assessment of the Safety of these brands was made. The overall aim was to enable better governmental heath policies.

Experimental
A sample-size of 409 subjects was obtained for the survey with statistical-significance (Confidence-Interval 4.86, Confidence-level 95%) (DOCAS, 2012). The survey was prepared using World Health Organization (WHO)/Food and Drug Administration, USA (FDA) formats (Lando et al., 2016), and physical/electronic versions distributed among subjects (both residents & food-workers). Data collected was analyzed using MS Excel. Scores were calculated for FP-Awareness, FP-General Awareness, General-Hygiene, Food-Hygiene, Hand Wash (HW)-Hygiene.

Water supplies are a major source of diarrhea-inducing agents but this factor was largely controlled among the subjects as they were all urban-residents of Colombo where the 2015 Annual Health bulletin census by the Ministry of Health (MOH) showed 96% of households had access to protected drinking-water supplies (MOH, 2017).

Overall subjects had a pass rate ≥50% in all Awareness & Hygiene scores, 67% used Hand-Wash/Sanitizer brands and 66% Regularly-washed hands before eating. 20-59 age-groups showed best overall performance. Hand-Wash/Sanitizer brands A, B, C, D were most-commonly used among a total of 7 reported. An inversely-correlating relationship between Regular Hand-Washing (RHW) and Diarrhea-Incidence was overwhelmingly observed. Further on among RHW-subjects, there was no significant difference in diarrhea-incidence among subjects who use or don't use hand-wash/sanitizer products which concurred with existing research (FDA, 2016). Eating-Outside was a significant factor among surveyed subjects with diarrhea-incidence and in connection, surveyed Food Workers showed better overall hygiene score-performances than non-Food workers but poorer performances in Food-Hygiene score, which could be a contributing factor in FP-outbreaks. Extrapolating on this, a national survey covering all districts is advised to improve National Health policies especially in light of the continuing large-scale FP outbreaks (de Silva, 2016; Perera, 2014).

ABST (Antibiotic-Sensitivity-Testing) & MIC (Minimum-Inhibitory-Concentration) tests

were carried out using E.coli cultures to analyze their anti-microbial properties. The experiments were carried out under Biosafety-Level 1 standards which are required for handling E.coli and all appropriate safety and aseptic techniques were followed (CDC, 2010; SLAB, 2015). International SOP's (Standard Operating Procedures) were followed and McFarland turbidity-standards were used to standardize the E.coli suspensions (Lalitha, 2009).

Among Hand-Wash brands, ABST tests showed D/C and MIC tests showed A/D/C with equally best performances, while among Hand-Sanitizer brands, ABST tests showed A and MIC tests showed A/B/D with equally good performances. However further studies are required with more cultures per brand and using other common diarrhea-causing agents for more statistically valid and comprehensive results.

Further on brands C, E & F were identified as containing FDA-banned chemicals Triclosan & Triclocarbon, which have shown adverse effects in long-term animal studies as well as contribute towards increased bacterial resistance (FDA, 2016), pointing to a need for stricter regulatory-controls in the local Hand-Wash market.

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Serum creatinine levels and its relationship to blood pressure in chronic kidney disease of unknown aetiology (CKDu) patients in Kebithigollewa, Sri Lanka

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Abstract

CKDu is being a major public health problem since past two decades in Sri Lanka mainly endemic in NCP. Though hypotheses has been suggested, aetiology of the nephropathy is still unknown. Early diagnosis of the condition reduces the progression of the end stage kidney disease where several biomarkers are used for the diagnosis of kidney damage. Serum creatinine is one a diagnostic biomarker used for the detection of kidney damage. Due to the relation between kidney and heart function, blood pressure of an individual can varies in kidney function alterations. Therefore this descriptive study was conducted to find out the relationship between the blood pressure values and serum creatinine values of CKDu patients.

The study was carried out in Kebithigollewa region, a CKDu endemic area in NCP. Serum creatinine and blood pressure values of 37 CKDu patients was correlated in the study for the evaluation of relationship between the parameters. Correlation analysis was conducted using Pearson's correlation where further analysis was carried out by using regression analysis. Study revealed no significant correlation between average systolic pressure with serum creatinine (P= 0.716) and average diastolic pressure with serum creatinine (P= 0.763). However, regression analysis revealed a positive and negative coefficient gradient between average serum creatinine with systolic blood pressure and diastolic blood pressure respectively.

Author's keywords

CKDu, Serum creatinine, blood pressure, Pearson's correlation.

Introduction

Chronic kidney damage can be categorized according to their aetiology either as chronic kidney disease (CKD) or chronic kidney disease of unknown aetiology (CKDu). CKD and CKDu are condition that cause reduction in the nephron activity. CKD cause due to several known reasons such as diabetes mellitus and hypertension (Sarnak et al., 2003; Levey and Coresh, 2012; Chevalier, 2018) where aetiology of CKDu is unknown. Prevalence of CKDu is higher in dry zone area such as North Central Province compared to wet zone. Though the aetiology of the nephropathy is still unknown, several hypothesizes has been suggested for the cause of CKDu (Weaver, Fadrowski and Jaar, 2015) such as; heavy metal contaminations, Ochratoxin A and high concentration of fluorides are some of the postulates. Serum creatinine (SCR) is a waste product produce in the muscle metabolism which normally filtered through the kidney and excrete with urine. Therefore, SCR value of an individual can be used as a diagnostic biomarker for the evaluation of the CKDu where increase in the creatinine level represents kidney injury (Ratnayake et al., 2017; Koko, 2011; Horowitz, 2014).

This study was conducted to evaluate the relationship between SCR and blood pressure of CKDu patients in Kebithigollewa. Therefore the study provide data regarding the variation of SCR vales and blood pressure of CKDu patients and relationship among them.

Experimental

All the 37 patients included in the study was selected according to the MOH grading criteria for the diagnosis of CKDu and who had continuous visit for the CKDu clinic held in Kebithigolewa, for 5 months period. SCR values and blood pressure values of these CKDu patients were used as parameters for the evaluation of the relationship among blood pressure and SCR. Furthermore, the study evaluated the prevalence of the CKDu among male and females, and eGFR values of selected CKDu patients. Pearson's correlation analysis was used for the evaluation of the relationship among the SCR and blood pressure where CKD epidemiology collaboration equation was used for the calculation of eGFR. SCR values of the patients were quantitatively measured by fully automated biochemistry analyzer (Tecom, Tc-220) using the principle of modified Jeffe's method and LCD display Mercury-free sphygmomanometer (Spirit) was used to measure blood pressure values of patients.

Obtained average SCR values with average systolic (ASP) and diastolic blood pressures (ADP) in the correlation analysis, showed positive correlation coefficients; $r = 0.062$ and $r = 0.051$ respectively. But this correlation analysis didn't revealed a significant correlation between average SCR with ASP ($P= 0.716$) and average SCR with ADP ($P= 0.763$). However, further analysis carried out using linear regression model coefficient, showed positive coefficient gradient for ASP and negative coefficient gradient for ADP implying increase of ASP results increase in average SCR values while increase in ADP results decrease in average SCR values. The study also reveals that CKDu condition is more prevalent among males (59%) than females (41%) in Kebithigolewa region meanwhile all the patients included in the study represented eGFR <60 mL/min/1.73m3. These results obtained in the study will be helpful for the future investigations carried out regarding the CKDu condition with higher study populations.

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Investigation of anti-inflammatory activity of Rauvolfia tetraphylla using
in vitro protein denaturation assay

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Abstract

Inflammation is mostly caused by pathogens such as bacteria, fungi or virus, external injuries or exposure to chemicals and radiation. Inflammation is a nonspecific defense mechanism, that causes tissue injury due to a pathogen. Nonsteroidal Anti-inflammatory Drugs (NSAIDs) are a class of synthetic drugs that are widely used to treat inflammation but it is associated with side effects in the gastro intestinal and cardiovascular systems. Therefore, this study was aimed to investigate the anti-inflammatory properties of Rauvolfia tetraphylla (Family: Apocynaceae) as a potential substance to be developed as an anti-inflammatory drug.

Aqueous Root Extract (ARE) of R. tetraphylla was used to examine the in vitro anti-inflammatory effect with diclofenac sodium as the reference drug, using in vitro heat induced egg albumin denaturation assay. The concentrations of the root extract used were 781.25 µg/mL, 1562.5 µg/mL, 3125 µg/mL, 6250 µg/mL and 12500 µg/mL. The concentrations of diclofenac sodium used in the assay were 78.12 µg/mL, 156.25 µg/mL, 312.5 µg/mL, 625 µg/mL, 1250 µg/mL and 2500 µg/mL. The IC50 value of the extract and diclofenac sodium were 2461 µg/mL and 7628 µg/mL and R2 values were 0.7159 and 0.9563 respectively with a significance level of $P<0.05$. In the phytochemical analysis performed R. tetraphylla revealed the presence of phenols, carbohydrates, alkaloids, saponins, flavonoids, quinones, steroids and terpenoids. The results suggest that due to the synergistic activity of the phytochemicals, R. tetraphylla possesses anti-inflammatory activity. As NSAIDs have adverse effects, there is a demand for novel herbal based safe drugs. Therefore, it is concluded that R. tetraphylla roots have the potential to be developed into an efficacious natural anti-inflammatory drug.

Author Keywords

Rauvolfia tetraphylla, anti-inflammatory, NSAIDs, heat induced egg albumin denaturation assay, ARE

Introduction

Rauvolfia tetraphylla belongs to family apocynaceae and commonly known as 'Devil Pepper' is native to West Indies. It's found in other Asian countries like Srilanka and India. R. tetraphylla is a branched woody shrub with creamy white flowers and purple drupes, grows up to 1.5 meters in height and presence of 5-7 corymbs. [Rahman and Ahfuza, 2015; Vinay et al., 2016]. R. tetraphylla roots are sedative and used as ethno medicine to treat high blood pressure, snake bites and psychotic disorders. Decoction is administered to increase uterine contraction. [Gupta et al., 2012; Pandey, Radha and Dey, 2016]. There are about 85 species in this particular genus Rauvolfia and found mainly in tropical regions. R. tetraphylla is rich in phytochemicals such as Reserpine,

Alkaloids, Canescine, Ajmalicine, Serpentine and Raunescine. Phenols and flavonoids are responsible for anti-inflammatory effect. [Rao et al., 2012; Ambriz-Pérez et al., 2016; Vinay et al., 2016]

Inflammation is a nonspecific defense mechanism, that causes tissue injury [Willey, Sherwood and Woolverton, 2009]. Heat, redness, swelling, pain and loss of function are the five cardinal signs of inflammation. These occur due to the action of cytokines and other pro-inflammatory mediators. It involves basophils, neutrophils, T- cells, B cells and mast cells [Janeway et al., 2001; Punchard, Whelan and Adcock, 2004].

NSAIDs are a class of drugs prescribed to reduce inflammation but these are associated with several side effects such as gastro intestinal bleeding and immune suppression [Adebayo et al., 2015]. NSAIDs inhibit Cyclooxygenase enzyme-1 and Cyclooxygenase enzyme 2 (COX-1 and COX-2) those take part in prostaglandin synthesis, causing anti-inflammatory, analgesic and antipyretic effect [Rao, Kabir and Mohamed, 2010; Day and Graham, 2013].

Therefore this study was carried out to determine the quantitative analysis of in vitro anti-inflammatory activity of ARE of R. tetraphylla using heat induced egg albumin protein denaturation assay.

Experimental

Two hundred grams of R. tetraphylla roots were thoroughly washed in running water and shade dried until a constant weight was obtained. Hundred grams of roots were crushed using mortar and pestle. Crushed roots were boiled in 1920 mL of distilled water using a Bunsen burner until the volume reduced to 240 mL and finally to 100 mL. The whole procedure took approximately five hours. Then the root extract was filtered using a double layer muslin cloth and the filtrate was handed over to Industrial Technology Institute of Sri Lanka to freeze dry. The freeze dried root extract of yield 9.13 g (9%) and was stored under -20 °C until use.

Two hundred and fifty milligrams of freeze dried R. tetraphylla roots were dissolved in 20 mL of distilled water and a stock solution of 125 µg/mL was made. Then serial dilution was carried out by series of two-fold dilution. The concentrations of root extract were 390.62 µg/ml, 781.25 µg/mL, 1562.5 µg/mL, 3125 µg/mL, 6250 µg/mL and 12500 µg/ml and the concentration of diclofenac sodium were 78.125 µg/mL, 156.25 µg/mL, 312 µg/mL, 625 µg/mL,1250 µg/mL and 2500 µg/mL. Diclofenac sodium was used as the positive control. Each test tube contained 2 mL of prepared mixture, 0.2 mL of egg albumin and 2.8 mL of immediately prepared PBS (phosphate buffer saline). Negative controls were prepared by adding the same amount of PBS, egg albumin and 2 mL of distilled water. All the sample mixtures were incubated at 37 °C for 15 minutes and were heated using a water bath under 70 °C for 5 minutes. Ones all sample mixtures returned to room temperature absorbance readings were measured using UV spectrophotometer at 660nm. Percentage inhibition was calculated for each concentration.

Statistical analysis was carried out and the log - dose vs response curve expressed positive correlation. The IC50 value of ARE of R. tetraphylla was 2461 µg/ml and R2 value was 0.7159 while the positive control diclofenac sodium showed a dose response of

IC50 value 7628 µg/ml and R2 value of 0.9563. Qualitative assessment of phytochemical analysis was carried out from the ARE of R. tetraphylla and the results indicated the presence of carbohydrate, alkaloids, phenols, saponins, flavonoids, quinones, steroids and terpenoids. The correlation between the phytochemical compounds and anti-inflammatory activity has been well defined where the presence of phenols and flavonoids revealed an effective anti-inflammatory activity. Therefore R. tetraphylla has the potential to be developed into an effective anti-inflammatory drug in future.

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Evaluation of In vitro anti-inflammatory activity and the phytochemical profile of Canavalia ensiformis and Eclipta prostrata

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Abstract

Non-steroidal anti-inflammatory drugs are used to treat inflammation throughout the world but causes severe adverse effects. Thus, there is a demand for novel potent anti-inflammatory agents with lower side effects. The aim of the study was to determine the in vitro anti-inflammatory activity and the phytochemical profile of the two Sri Lankan ethno medicinal plants Canavalia ensiformis and Eclipta prostrata. The egg albumin denaturation assay was done using aqueous leaf extract of Canavalia ensiformis and aqueous seed extract of Eclipta prostrata and diclofenac sodium as the reference drug. Both the Canavalia ensiformis leaves and Eclipta prostrata seeds showed a moderate dose dependent inhibition of denaturation of egg albumin protein with an IC50 value of 1366 µg/mL ($r2=0.9599$, $p<0.05$) and 1710 µg/mL ($r2=0.9598$, $p<0.05$) respectively. Diclofenac sodium also showed a dose dependent inhibition of protein denaturation with an IC50 value of 794 µg/mL ($r2=0.984$, $p<0.05$). Both the extracts showed a moderate potency in anti-inflammatory activity when compared with the reference drug. The phytochemical profile of both the plant extracts were performed and the study concludes that the main phytochemicals that mediate the anti-inflammatory activity of Canavalia ensiformis leaf extract are flavonoids, phenols, saponin, tannin and Eclipta prostrata seed extracts are phenols, alkaloids, terpenoids and tannins. This novel finding confirms the use of both the plant extracts as anti-inflammatory agents and the use of both plant extracts in traditional medicine in Sri Lanka for the treatment of inflammation is justified.

Author Keywords

Canavalia ensiformis, Eclipta prostrata, inflammation, traditional medicine, egg albumin denaturation assay, phytochemicals.

Introduction

Inflammation is the body's response to an infection, destruction or injury that is characterized by pain, redness, swelling, heat and physiological functions being disturbed (Ghayathri and Lakshmi, 2015). In protein denaturation the secondary and tertiary structure of the protein will be lost due to external compounds or stress like strong base or acid, organics solvent, inorganic salt (concentrated) or heat. When a protein denatures, it loses its biological functions. Protein denaturation is a considerable cause for inflammation and will induce the production of antigens that is associated with hypersensitivity type III and cause inflammation (Heendeniya, Ratnasooriya and Pathirana, 2018).

Many range of diseases are linked with inflammation. Anti-inflammatory drugs are used

to treat inflammation. Currently anti-inflammatory drugs have high demand in the modern world. The anti-inflammatory drugs that are used commonly are called as non-steroidal anti-inflammatory drugs (NSAIDs) (Hawkey et al., 2012). These anti-inflammatory drugs prevent protein denaturation that behave as antigens and cause auto-immune disease (Sangeetha and Vidhya, 2016). NSAIDs work by inhibiting the enzyme cyclooxygenase (COX), an enzyme that produce prostaglandins (PGs) (Vane and Botting, 1998). The most commonly used NSAID worldwide is diclofenac. These have adverse effects mainly in the gastrointestinal tract, cardiovascular system and renal systems.

There is a great demand in the modern world for anti-inflammatory drugs from natural sources as it is cheap, novel, safe and efficacious (Heendeniya, Ratnasooriya and Pathirana, 2018). Medicinal plants contain many compounds that are biologically active and are extensively used in treating many diseases as pure compounds or crude material. Due to side effects and toxicity of NSAIDs, herbal medicines are more popular (Kumar et al., 2013).

Eclipta prostrata Linn belongs to the Asteraceae family and is usually called as false daisy. It grows in lowland and upland conditions and is distributed in damp areas, commonly as rice weeds (Gani and Devi, 2015). This plant extravagantly grows throughout Sri Lanka and is highly used by traditional and ayurvedic physicians as medicines (Ediriweera, 2010). Eclipta prostrata is a dark green or greenish-brown annual herb that is 10-60 cm tall. The leaves are lanceolate, sessile, opposite and arranged densely on both sides of cylindrical stem. Eclipta prostrata Linn has some crucial pharmacological activities such as antioxidant, anti-aging, analgesic, hypolipidemic, hepatoprotective, anti-inflammatory, anti-microbial, immunomodulatory, antiviral and antivenom (Institute of Ayurveda, 2018). Canavalia ensiformis Linn belongs to the immense family Fabaceae that contains 500 genera and around 15 000 species of wild and cultivated plants. Canavalia ensiformis is also known as jack bean and it exists as both climbing and bush types. The bush types are self-supporting, compact and erect that form a canopy of about 100 cm in height (Nwokolo and Smartt, 1996). Canavalia ensiformis has some important pharmacological activities such as amylotic, haemolytic, hypocholestrolemic, anti-cancer, anti-inflammatory, anti-aggregant and antiviral. In Sri Lankan ethno medicine, Canavalia ensiformis leaves are used in the treatment of high cholesterol, high blood pressure, herpes, capillary fragility, burn and allergy (Institute of Ayurveda, 2018).

The study was carried out to determine the quantitative in vitro anti-inflammatory activity of the leaves of Canavalia ensiformis and the seeds of Eclipta prostrata. Egg albumin denaturation assay was carried out for the investigation of percentage inhibition albumin protein denaturation by the Canavalia ensiformis ALE and Eclipta prostrata ASE. The phytochemicals responsible for the activity was furthermore investigated by qualitative phytochemical analysis.

Experimental
100 g of Eclipta prostrata seeds were measured and boiled in 1920 mL of distilled water using a Bunsen burner until the volume of the solution was reduced to 240 mL for 5 hours. The solution was further concentrated for 1 hour until the volume became 100 mL. Using a muslin cloth the aqueous extract was filtered and stored in an air tight bottle. The same procedure was followed for the aqueous extraction of Canavalia ensiformis

leaves and both the extracts were labelled and stored under constant temperature (4°C). The prepared aqueous seed extract (ASE) of Eclipta prostrata and aqueous leaf extract (ALE) of Canavalia ensiformis were then freeze dried by transporting to the Industrial Technology Institute of Sri Lanka. The samples were freeze dried and stored until use at -20°C.

About 20 mL of distilled water was added to 250 mg of powdered aqueous seed extract of Eclipta prostrata and a stock solution of 12500 µg/mL was prepared. A series of concentrations of 12500 µg/mL, 6250 µg/mL, 3125 µg/mL, 1562.5 µg/mL, 781.25 µg/mL and 390.62 µg/mL were prepared using the stock solution by serial dilution of two folds. A series of concentrations of 2500 µg/mL, 1250 µg/mL, 625 µg/mL, 312 µg/mL, 156.25 µg/mL and 78.125 µg/mL were prepared for diclofenac sodium as the reference drug (positive control). Reaction mixtures of samples were prepared with 2 mL of the sample from each concentration of ASE, 2.8 mL of freshly prepared Phosphate Buffered Saline (PBS) and 0.2 mL of egg albumin (extract of hen's egg). Reaction mixtures of diclofenac sodium (positive control) were prepared by replacing 2 mL of sample with diclofenac sodium from each concentration. Three negative controls were prepared by replacing 2 mL of the sample with distilled water. Three negative controls were prepared by replacing 2 mL of the sample with distilled water. The reaction mixtures of each concentrations of sample, diclofenac sodium and the negative control prepared were incubated at 37°C for 15 minutes. After incubation the reaction mixtures were heated in water bath at 70°C for 5 minutes. After 5 minutes the samples were cooled down to room temperature and the absorbance of the samples and diclofenac sodium at each concentration were measured using UV/VIS spectrophotometer at wavelength 660nm. The same procedure was repeated for the powdered aqueous extract of Canavalia ensiformis leaves and the absorbance was measured.

The anti-inflammatory activity of ALE of Canavalia ensiformis expressed dose response anti-inflammatory property with an IC50 value of 1366 µg/mL and the ASE of Eclipta prostrata expressed dose response anti-inflammatory property with an IC50 value of 1710 µg/mL, while diclofenac sodium used as the control of this assay, showed a dose response with an IC50 value of 794 µg/mL. Qualitative assessment of the phytochemicals present in the leaf extracts of Canavalia ensiformis were carried out and the results showed the presence of phenols, alkaloids, carbohydrates, flavonoids, tannins, saponins, glycosides (anthraquinone) and cardio glycosides. Whereas seed extracts of Eclipta prostrata showed the presence of phenols, alkaloids, carbohydrates, steroid, terpenoids, tannins, glycosides (anthraquinone) and cardio glycosides. Canavalia ensiformis leaves showed moderately potent in vitro anti-inflammatory properties mediated by flavonoids, phenols, alkaloids, saponin and tannins. Eclipta prostrata seeds showed moderately potent in vitro anti-inflammatory properties mediated by phenols, alkaloids, terpenoids and tannins. This novel finding confirms the use of both the plant extracts as anti-inflammatory agents.

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Variation of Blood Pressure and Urine Albumin in CKDu patients in the North Central Region of Sri Lanka

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Abstract

The Human kidneys being important organs to remove waste and perform other functions in the body, result in Chronic Kidney Disease (CKD) when it undergoes continuous damage. Usually it caused by diabetes and hypertension, but recently in the last two-three decades, the prevalence of CKD of Unknown Aetiology (CKDu). Albumin is an early diagnostic marker of CKDu while hypertension is observed developing in these patients as the condition progresses. Therefore, the main objective of this study is to identify if there is a significant correlation between albumin excretion and blood pressure changes in CKDu patients in kebithigollawa, North Central Region of Sri Lanka.

The methods used were mercury-free digital sphygmomanometer to measure blood pressure and urine albumin: Creatinine ratio (ACR) was determined by calculating the ratio manually from separately determined albumin and creatinine values. Urine albumin was determined using the QR-Specific Protein analyzer that immunoturbidimetric technique and urine creatinine was measured using the TeCom T220 fully automated biochemistry analyser that uses modified Jeffe's Reaction. The data collected on Systolic pressure, Diastolic Pressure and ACR from 33 patients, 22 males and 11 females for four consecutive months were analysed using the Spearman Correlation test using the SPSS Software version 20.

The Significance value between Systolic pressure and Diastolic pressure with ACR was found to $p=0.202$ and $p=0.681$ [$p>0.05$] respectively. Therefore, it was concluded that there is no significant relationship between blood pressure and Albumin in CKDu patients in the NCP of Sri Lanka.

Author Keywords

Albumin, Creatinine, Albumin: Creatinine ratio, Systolic Pressure, Diastolic Pressure, Spearman Correlation, Chronic Kidney disease of Unknown aetiology North Central Region

Introduction

The two human kidneys are organs that take part in important body functions like maintaining body fluids, ions and excreting body waste (Fernando and Sivakumaran, 2018). When an external or internal factor interrupts the function of these kidneys, it results in acute or chronic kidney diseases. Chronic kidney disease (CKD) is a slow progressive condition which is usually resulted due to diabetes, hypertension and snake bite. But in early 1990s, CKD irrespective of the usual causes were identified specifically in dry zones of Sri Lanka and it was termed as Chronic Kidney disease of unknown aetiology (CKDu) (Elledge et al., 2014; Fernando and Sivakumaran, 2018). This condition is one of the recent health crisis in many other countries too, like North

America and India (Redmon et al., 2014). CKDu is more prevalent in males compared to females and is of 5 stages depending on the e-GFR values as stated in Table 1.

Table 1: The Stages of CKDu adapted from Thomas et al., 2008

Stage	Interpretation (e-GFR)
Stage 1	≥ 90 mL/min per 1.73 m2
Stage 2	60 to 89 mL/min per 1.73 m2
Stage 3	30 to 59 mL/min per 1.73 m2
Stage 4	15 to 29 mL/min per 1.73 m2
Stage 5	< 15 mL/min per 1.73 m2

Though the exact cause is yet not concluded, the causative factors of CKDu are explained using genetic factors and a variety of nephrotoxins like heavy metals, reactive species, bacterial toxins and fungal toxins found in the agricultural lands and water bodies (Wanigasuriya et al., 2011; Wanigasuriya, 2012; Sayanthooran et al.,2016; Madhushanka et al., 2016). Furthermore, CKDu is irreversible and asymptomatic till the latter stages and then patients experience fatigue, panting, loss of appetite, nausea, hypertension and edema (Jayatilake et al., 2013; Mullriyawa, 2013). According to the Epidemiology Unit of the Ministry of health (MOH) of Sri Lanka (2017), CKDu is screened in patients by the use of chemical analysis of blood and urine inorder to identify the bio-markers of CKDu. To date this condition has no cure while the only treatment options are kidney transplantation or dialysis. Due to the unaffordable cost of these treatment options, patients rely on traditional medications (Elledge et al., 2014). Albumin is one of main bio-markers of CKDu while hypertension in case of CKDu occurs as a symptom in the latter stages. In researches by Xu et al., (2014) and Takase et al., (2015) it is stated that generally albuminuria can result in hypertension. Therefore, this study is designed in order to check if the Hypertension that occurs in CKDu patients of the North Central Region of Sri Lanka, have a significant relationship to their albuminuria values.

Experimental
Urine samples and blood pressure were collected with the consent of the patients who visited the monthly Ayurvedic clinic of kebithigollawa at the North Central Region for a period of 4 months. The samples were transported to Colombo within 24 hours of collection and separately tested for urine creatinine and urine albumin to calculate ACR manually. Blood pressure (Diastolic pressure and Systolic pressure) was collected using the Mercury-free sphygmomanometer and urine creatinine was measured using fully automated biochemistry analyzer TeCom 220 which uses modified Jeffe's reaction. For this purpose, the auto-analyser was set to determine urine creatinine, quality control test was performed and then 50 µl of each urine sample was added to the sample disk and the results were obtained. Urine micro-albumin was determined by the use of the QR-100 Specific protein Analyzer which used immunoturbidimetric technique. Here the analyzer was set up to determine urine micro-albumin, quality was tested and urine of volume 100 µl was tested from each urine sample and the results were obtained. The creatinine and micro-albumin values were used to determine the ACR. The averages of systolic pressure, diastolic pressure and ACR values of 33 patients who attended the

clinic for four consecutive months were analyzed using the Spearman correlation test using the SPSS software version 20.

It was found out that the spearman's correlation coefficient within systolic pressure and ACR was 0.228 and within diastolic pressure and ACR was 0.074, which indicated that there is a weakly positive association between blood pressure (systolic and diastolic) and ACR in these patients. But this association is not significant as the significance between systolic pressure and ACR and between diastolic pressure and ACR was p=0.202 and p=0.681 [p>0.05; Null hypothesis accepted].

Therefore, this study concludes that there is an association between blood pressure and urine albumin but it is not significant [p>0.05]. But as the sample number of this study was very small, in future the study can be implemented on a large patient sample size.

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Assessment of limitations of broth Micro dilution for susceptibility of Vancomycin against MRSA

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Keywords

Broth microdilution, E-test, methicillin-resistant staphylococcus aureus, MIC, susceptibility, vancomycin

Introduction

Healthcare-associated methicillin-resistant staphylococcus aureus (HA-MRSA) developed soon after the introduction methicillin mostly in hospitalized patients. This bacteria has shown resistance to multiple drugs. Antibiotics, like penicillin, were used to treat the infections and some bacteria have found ways to withstand these medications. In the late 1950s, S. aureus developed resistance against penicillin through an enzymatic inactivation process. Methicillin, a semi-synthetic form of penicillin, was then introduced in 1959 as a treatment of the penicillin-resistant S. aureus. Unfortunately, as soon as methicillin was put in to clinical use, methicillin resistant (MRSA) strains developed (Stapleton and Taylor, 2002). Therefore vancomycin is now the drug of choice for the treatment of MRSA.

Minimum inhibitory concentration (MIC), which is the lowest concentration of an antimicrobial that is needed to completely inhibit the growth of bacteria (Andrews, 2001), is used to determine the susceptibility of an antibiotic against bacteria. If the MIC is less than or equal to the breakpoint it is susceptible and if the MIC is greater than the break point it is considered intermediate or resistant to the antibiotic. Vancomycin is an antibiotic and its bactericidal action results from inhibition of the bacterial cell wall synthesis. Clinical and laboratory standards institute (CLSI) established susceptibility breakpoints for vancomycin as follows: susceptible, MIC ≤2 µg/mL; intermediate (VISA), 4–8 µg/mL; and resistant (VRSA), ≥16 µg/mL (Appelbaum, 2007).

Accurate interpretation of the MIC results is important because overestimation would lead to the unnecessary use of other antibiotics, when vancomycin would still be useful. Therefore evaluating different MIC test methods against the CLSI recommended gold standard broth microdilution (BMD) would help in accurate interpretation. E test is another method of antimicrobial resistance determination. It provides direct quantification of antibiotic susceptibility. An E test strip contains a predefined, exponential gradient of antibiotic concentrations packed within a plastic strip (Tankeshwar, 2013).

In this study, Clinical isolates were acquired from Colombo South Teaching Hospital, Sri-Lanka. A total of 72 clinical isolates of staphylococcus aureus were obtained. MRSA strains were identified by cefoxitin disk diffusion method and the vancomycin MIC was determined through BMD and E-test. The determination of the correlation between methods was done using the Mann-Whitney U test.

The objective of this study is to compare two methods, broth microdilution (BMD) and E-test, analysing their accuracies, in the determination of vancomycin MIC against MRSA.

Experimental

Samples were collected from the department of Microbiology, CSTH. A sum of 107 clinical isolates were obtained from samples such as urine, blood, wound and skin swabs, peritoneal and pleural fluids, tracheal aspirates and sputum samples. These samples were numbered from 1 to 107 to be able to identify the samples throughout the study. In order to identify the S. aureus, conventional biochemical tests such as catalase, coagulase and DNase was performed. The 72 S. aureus (confirmed from the above tests) were tested with 30 µg cefoxitin disks on Muller Hinton agar (MHA) plates, for methicillin resistance. Bacterial suspensions were prepared and the plates were swabbed methodically. After incubation, the diameters of the zones of inhibition were measured by placing a Vernier caliper on the lid of the plate. The values were compared with the CLSI standard. Broth microdilution was then carried out on a 96 well microtitre plate and incubated at 37°C for 24 hours. The turbidity was observed by eye. Lack of turbidity indicated no bacterial growth.

This was done according to the manufacturer's instructions. After incubation for 24-48 hours an inhibition zone the shape of an oval intersects the test strip at the inhibitory concentration of the antibiotic These zones of inhibition was observed and recorded.

Data was stored in Microsoft Excel and IBM SPSS version 25 was used to statistically analyse the data. The Kruskal-Wallis test was used to assess whether samples originated from the same distribution, with post hoc comparisons of BMD and E test MICs by Mann-Whitney U test (or Wilcoxon-Mann-Whitney test), to check whether there was a significant association between the two independent groups.

Results

Out of 107 clinical isolates, 72 were found to be S. aureus by catalase, coagulase and DNase tests. Out of the 72, 30 was identified as methicillin resistant Staphylococcus aureus (MRSA). The vancomycin MICs for E test and BMD ranged from 0.38- 2 µg/mL and 0.25-1 µg/mL respectively. All samples turned out to be vancomycin susceptible irrespective of methodology, with MICs ≤ 2 µg/mL.

The Kruskal-Wallis test that was used to assess whether samples originated from the same distribution showed that irrespective of the testing method, the distributions of the 30 samples were significantly different i.e. independent (P = 0.000, sig < 0.05).

Following that, Mann-Whitney U test revealed vancomycin MICs of E test and BMD had a statistically significant group difference i.e had limited agreement with each other (Mann-Whitney U=138.000, p=0.000, sig < 0.05 so the null hypothesis was rejected), and therefore the accuracy of the two tests were not the same.

Moreover, to assess the extent of agreement between the tests further, the percentage of isolates producing identical results was calculated and found to be 3.33 highlighting the certainty of the lack of agreement between the values and hence the difference in the tests.

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Assessment of the prevalence of lymphatic filariasis among school children in Ratmalana area using Wuchereria bancrofti SXP-1 antigen specific ELISA method

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Abstract

Sri Lanka had been endemic for Lymphatic Filariasis for past several decades. But with the efforts of Anti Filariasis Campaign of Sri Lanka along with the World Health Organization and Global Programme for Elimination of Lymphatic Filariasis (GPELF), it was announced that Sri Lanka had eliminated lymphatic filariasis as a public health burden by 2016. However, the national Programme to Eliminate Lymphatic Filariasis (PELF) carries out transmission assessment surveys to identify whether active LF transmission is occurring, especially in areas that had not been surveyed previously. The current study was done in Ratmalana area which had not been previously surveyed for LF with the goal of identifying prevalence of LF among school children of Ratmalana area.

A total of 108 urine samples (60 males, 48 females) were collected from students in grade 2 to 5 in Kandawala Central College, Ratmalana. 5 ml of urine was collected from each student and the samples were tested for the presence of IgG4 antibodies specific for Wuchereria bancrofti SXP-1 antigen (Wb-SXP-1) using ELISA technique. None of the urine samples were positive for the Wb-SXP1 specific IgG4, indicating the absence of LF transmission among this sample population of school children in Ratmalana area, Sr4i Lanka. The highest IgG4 antibody titer was found to be 3.824 U and the lowest was -1.985 U. A statistically significant difference in antibody titers was seen between the grades (P=0.781) but it was found that there was no statistically significant difference between the antibody titers of male and female students (P=0.211).The current study alone is not sufficient to establish absence of transmission of LF in Ratmalana area. Therefore, a study with a higher sample size covering more divisional areas in Ratmalana should be carried out.

Author Keywords
Lymphatic Filariasis, ELISA, Wb-SXP-1, Urine IgG4

Introduction
Lymphatic filariasis (LF) is a vector borne parasitic disease which is mainly caused by Wuchereria bancrofti in 90% of cases (Shenoy, 2008). The disease is asymptomatic in the initial stages but in the latter part of the disease, it impairs the lymphatic system and leads to abnormal enlargement of body parts due to collection of lymph fluids. This causes conditions such as lymphedema, elephantiasis and hydrocele in men which is the enlargement of the scrotum (Center for Disease Control, 2013). Disfigurement, pain, severe disability and a social stigma are the main issues associated with lymphedemas

of filariasis patients (WHO, 2018). Chesnais et al. (2016) states that it affects around 120 million people in the world and that it's the second most common cause of disability worldwide.

Early and accurate diagnosis is key in eliminating any disease. IgG4 urine ELISA is a method that identifies filarial specific IgG4 antibodies in the patients' blood. It uses urine as a sample. Itoh et al. (2007) states that IgG4 urine ELISA showed a specificity of 95.6% and a sensitivity of 99% in their testing. Therefor this method was used as the preferred method of testing for this study. The objectives of this study was to evaluate transmission status of bancroftian filariasis using IgG4 urine ELISA in Ratmalana area where LF elimination is confirmed and to assess the level of anti-Filarial specific IgG4 antibodies of the urine samples of school children in the selected area.

Experimental

108 urine samples were collected from grade 2,3,4 and 5 students from Kandawala Central College, Ratmalana, Sri Lanka. About 5 mL of urine was collected from each individual and two drops of 0.1% sodium azide was added as a preservative agent. Three flat bottom 96-well microtiter plates were taken and 100 μL of coating buffer (containing 1 μg/mL of SXP-1) was pipetted onto each well. After an overnight incubation at 4 ˚C, plates were washed three times with 150 μL of washing buffer (PBS-Tween). Then 200 μL of casein buffer was pipetted on to each well to block the plates. After incubating the plates for 4 hours at room temperature, the buffer was discarded. Next 100 μL of urine samples were applied to respective wells. Each sample was duplicated onto the adjacent well to increase the accuracy of readings. The plates were then incubated overnight at room temperature. After the incubation, plates were flushed four times with the washing buffer. Then 100 μL of peroxide conjugated mouse monoclonal antibodies to human IgG4 (diluted to 1:4000 antibodies to casein) was pipetted onto each well and the plates were incubated at 37 ˚C for one hour.

Plates were then washed with washing buffer for four times. 30 mL of ABTS peroxide substrate containing Horseradish peroxidase (HRP) was made by mixing 15 mL of ABTS A and 15 mL of ABTS B. Then 100 μL this solution was pipetted on to each well and the plates were incubated for one hour at room temperature.

A standard curve was made on the 11th and 12th columns of the plate by serially diluting a serum sample of Wuchereria bancrofti positive individual. Each dilution was of 3-fold. Casein buffer was used as the absolute negative control. Absorbance readings were then obtained at 405 nm using an ELISA plate reader. Reference absorption readings were obtained at 630 nm. Using the readings of columns 11 and 12, a standard curve was created with a range of 0 to 7290 antibody units. 7.08 antibody units was taken as the cut-off mark. OD value corresponding to 7.08 antibody units was found to be 0.382 from the standard curve.

Table 1: Grade wise breakdown of the ELISA results

Grade	Number of participants	Number of Positives	Positive Percentage (%)	Highest OD recorded
2	24	0	0	0.071
3	23	0	0	0.072
4	28	0	0	0.0715
5	33	0	0	0.072

As illustrated in table 01, none of the students had an OD value above the cut-off mark (0.382). Hence all the samples were found to be negative for lymphatic filariasis. Therefor the prevalence of Lymphatic filariasis among grade 2-5 students' in Kandawala Central College, Ratmalana was found to be 0%. This showed the success of MDA programme that had been carried out in Ratmalana area from 2002-2006. A statistically significant difference (P=0.781) in antibody titer was found between the grades 2 to 5. But the difference in antibody titer between male and female students were found to be statistically insignificant (P=0.211). The current study however, does not represent the prevalence of lymphatic filariasis in Ratmalana area due to its smaller sample size. Therefore, further transmission assessment surveys (TAS) should be carried out with an increased sample size covering more number of divisional areas in Ratmalana to definitively identify whether fresh transmission of lymphatic filariasis is occurring in the Ratmalana area.

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A Critical Analysis on the Adequacy of the legal framework in reference to voting rights of differently abled people in Sri Lanka; with special reference to blind people

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Abstract

A person to be equally treated is a right which has been globally accepted where this has not covered the world's largest minority community which is considered to be the disabled people in some aspects. Therefore in order to protect their rights the United Nations Convention on Rights of the Peoples with Disabilities was established in the year 2006 which came into force on 2008. Sri Lanka ratified this convention on 2016 and became the 162nd state to ratify this convention where Sri Lanka has undertaken to abide by the terms of the Convention. Among those disabled people; the blind people are more significant. Right to vote is also a globally accepted right that cannot be alienated from a person. Even though the Sri Lankan government has guaranteed the right to equality and non-discrimination under fundamental rights of the constitution of the Democratic Socialist Republic of Sri Lanka; it has failed to protect the confidentiality and privacy in the event of casting their vote by a blind person where still they have to rely on the guardian or any officer who is in charge at the polls. Therefore it is time to make necessary legislative enactments and introduce new methods to safeguard the secrecy of a vote and the right to vote in which the research area of this research is whether the existing legal framework is adequate to protect the actual voting right or whether there should be new disable friendly legislations to implement the aforesaid voting rights and rights of the differently able people.

Author Keywords

Voting Rights, Differently Abled, Visually-Impaired

Experimental

People with disabilities are considered as a separate group in the society. Universal Declaration of Human Rights of 1948 states that "all human beings are born free and equal in dignity and rights" and they are also "entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status". Therefore disable people should be considered as differently able citizens of a country where their support can be also taken in methods. Also in order to protect the rights of this group of personals United Nation's Convention on the Rights of the Persons with Disabilities of 2006 was formed as a major framework on the global disability rights arena. This made the platform to address the issues which are relating to differently able personals.

Article 12 (1) of the Sri Lankan constitution guarantees the right to equality and non-

discrimination as a fundamental rights. Also Article 12(4) of the constitution sets out that the government may allow to take any affirmative action for the benefit of the persons with disabilities. Other than the protection guaranteed by the supreme law of the country; Sri Lankan government enacts the Protection of the Rights of the People with Disability Act No. 28 of 1996 for the purpose of to set the platform for the promotion, advancement and protection of the rights of the persons with disabilities. As per its interpretation clause; "persons with disabilities" means any person who as a result of any deficiency in his physical or mental capabilities whether congenital or not is unable by himself to ensure for himself wholly or partly the necessities of life. The right to vote is the most important political right of a citizen by which Article 4 (e) of the constitution Sri Lanka guarantees this right for its citizens. No citizen should be hindered or restricted de jure or de facto from exercising his or her political rights on the grounds of disability. Secrecy is considered to be one of the most important factors in an election. In the Sri Lankan context the secrecy of ballots is not maintained for visually-impaired people. Visually-impaired voters are concerned with the secrecy of their ballots as still they have to cast their vote relying on the guardian or any officer who is in charge at the polls.

Being a country that has the highest literacy skill in South Asia; the Sri Lankan education system provide various methods for visually-impaired students to read and write in braille. Even though this method is used in an effective way in countries like India; this method is not been used in Sri Lanka the context of voting.

Recommendations & Conclusion

Steps should be taken to guide the visually-impaired citizens to show how important it is to use their vote and it should be also introduced with new methods of voting systems. Braille signage feature is to be recommended to be included to the voting system; where the numeric stickers in Braille that denotes the serial numbers of the candidates and in case of independent candidates; the word 'Independent' shall be printed. Following the ongoing system a person who knows Braille should be appointed as an official to certify each such ballot paper.

Also by taking the usage of the technology a Direct Recording Electronic voting a system which shall have the capability of providing easy access for the visually impaired persons to cast their votes.

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A Critical Evaluation of the Role of International Humanitarian Law and ICRC in Respect of the Protection of Children Effected by International and Non-International Armed Conflicts

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Abstract

Armed conflicts affect children in all the ways it affects adults. Many children are deprived of food, clean water, health care and education; and many children are died due to the illness, malnutrition, lack of safe and violence at the armed conflicts. There is a well-known fact that, children have been affected by armed conflicts throughout the history including new levels of suffering in recent context. Children are dependent on the care and thereby they need the attention, affection and love from their parents and the guardians, which have been drastically disrupted by the armed conflicts. Further, the impacts made by the armed conflicts in childhood shall adversely affect the life of children more than the adults.

Death, injury, disability, illness, rape and prostitution for subsistence, psychological suffering, moral and spiritual impacts, sexual exploitation, social and cultural losses, child soldiers are some of the major impacts made over the children by the armed conflicts. However, the International Humanitarian Law (IHL) and the International Committee of Red Cross (ICRC) attempts to prevent the aforesaid impacts by consulting States and the non-international armed groups. Implementation of Geneva Conventions on the Rights of the Children is one of the attempts step forward by the IHL and ICRC.

This research is based on qualitative and quantitative data including some significant researches done by the ICRC at the implementation of IHL and the secondary data has been gathered from the law reports, books, journals and dissertations. The objective of this research paper is to critically evaluate the role of IHL and ICRC at the protection on child victims in war.

I have found that, some efforts have been taken by the States to ensure the protection of the children during the armed conflicts by implementing IHL and with the commendable support of ICRC.

Keywords

International armed conflict, non-international armed conflict, International Humanitarian Law, International Committee of Red Cross, Geneva Conventions.

The basic foundation of the protection of children at armed conflicts was significantly uniformed after the Second World War. Since 1949, with the adoption of Fourth Geneva Convention, ICRC protects children those who have victimized from the armed conflicts. The said Convention has been established for the protection of civilian population in armed conflicts; however children as members of civilian population are covered by

the Convention. Inn 1977, two additional Protocols were introduced to the Geneva Conventions. Both these instruments improved the protection of civilian population including children. Specially, Protocol I fully regulates International Armed Conflicts and Protocol II covers Non-international Armed Conflicts. Based on such regulations, ICRC works for the protection of child victims in international and non-international armed conflicts, by drafting and implementing International Humanitarian Law.

In terms of the aforesaid provisions, children are protected during armed conflicts in two major ways inter alia general protection as members of the civilian population and special protection as members of the civilian population. Under the general protection children are entitled for the treatment of protected persons, protection from the inhuman treatment, respect of life, physical integrity and moral integrity. Therefore as other civilians, in addition to the said guarantees children are free from coercion, punishment, torture and reprisals in international armed conflicts. In non-international armed conflicts, based on the fundamental rights guaranteed by the respective States, children are getting benefits against inhuman treatment, punishment, coercion, torture and reprisals. (Common Article 3 of Four Geneva Conventions)

In light of the special protection, Protocol I provides that, children shall be the object of special respect and shall be protected against any form of indecent assault and the parties to the conflict shall provide them with the care and aid they require due to their age or any other reason. Protocol II provides the same mechanism during the non-international armed conflicts stating that, children shall be provided with the care and aid they require including the fundamental guaranties. In addition to the above provisions the Rule 135 of the Customary International Humanitarian Law provides that, children affected by armed conflict are entitled to special respect and protection, which applies for both international and non-international armed conflicts.

The ICRC plays a major and an active role in promoting the legal protection of children. The ICRC and the other child welfare organizations with the blessings of United Nations prepared many drafts conventions for the protection of children. Since 1939 ICRC initiated the need of the protection of children during the armed conflicts which came in to success in 1949 and 1977. The ICRC as a humanitarian organization doesn't await the legal provisions for protecting children in armed conflicts before undertaking operations for the protection of children (ICRC article). Further ICRC uses its mandate by providing sufficient means and methods for the protection of child victims during the war crimes. Generally, throughout the armed conflicts, the ICRC precedes the legal protection of children and endeavours to complete when the machinery for applying international humanitarian law is wanting.

The ICRC always makes a vitally important contribution to the children by tracing of missing persons, by exchanging of messages from family members and by reuniting the families separated by the armed conflicts. The Central tracing Agency (CTA) of the ICRC collects, gathers and transmits information of missing persons, captives, refugees, persons released from the unlawful detention by informing their families. It is so significant that, at the communication disruptions, the ICRC personally delivers such messages to the families on behalf of the said captives. Among such duties the ICRC gives priority and preference to the child victims by being in touch with them and their families until

reuniting them with their families or countries. In the Kampuchea conflict in Thailand, the ICRC and the CTA, on behalf of children separated from their parents through the armed conflict was identified of unaccompanied Khmer children placed in refugee camps in Thailand. The United Nations High Commissioner for Refugees and the ICRC conducts many programs by registering nearly around 4000 unaccompanied children during the armed conflicts with the purpose of reuniting them with their families or at least with their countries. (ICRC Reports)

In relation to the assistance, children benefit by the relief actions which the ICRC undertakes on behalf of civilian populations affected by armed conflicts. In some cases the main beneficiaries of ICRC assistance programs are children and adolescents. As an instance, in Zambia, during the Rhodesia/Zimbabwe conflict, where 18,000 of the 29,000 refugees from Rhodesia/Zimbabwe, were young people under sixteen, and 300 were young mothers with babies. (ICRC Reports) The conflict was over in 1980 and until the end of the conflict; the ICRC supplied these persons with a considerable amount of medical and material aid.

The ICRC endeavours to protect all the victims of international and non-international armed conflicts, and, by virtue of this, children are included in the actions which the ICRC undertakes during these conflicts. As a result of it children will be visited and will be personally consulted by the ICRC if they are being held by a party to an armed conflict and be included in the ICRC's actions or interventions on behalf of the victims of armed conflicts (ICRC Reports). The ICRC always takes special measures and mechanisms for the protection of children. For example, Al Ansar Camp in south Lebanon, where mainly Palestinian prisoners were detained, 212 children under sixteen were released under the auspices of the ICRC (ICRC Reports) and the delegates of ICRC took charge of the children and ensured their return to their families in the various regions of the Lebanon by affirming reuniting (ICRC Reports).

It also happens that the ICRC carries out a special operation for children with its mandate in international humanitarian law. The assistance program for orphanages, which the ICRC undertook in Kampuchea in 1981, is a case in point. Moreover during the non-international armed conflict in Sri Lanka with the terrorist group called LTTE, the ICRC provided medical and material aid for the civilians specially for the children by affirming their rights which guaranteed by the Geneva Conventions, two additional protocols and fundamental rights of Sri Lanka. It helps refugees, victims of the said armed conflict in Sri Lanka, to reunite with their families. The ICRC still conducts some programs by collaborating with the government of Sri Lanka, over the missing persons during the non-international armed conflict.

It could be concluded that, the principles lay down by the Geneva Conventions, additional two Protocols and customary international law have been carved and implemented by the ICRC at the international and non-international armed conflicts for the betterment and protection of children who have been victimized in such conflicts. It should be further taken into the consideration that, the ICRC has actively involved into the protection of the rights of the children who have been deprived of their rights during the armed conflicts; at the absence of general humanitarian law principles.

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Two Additional Protocols to the Four Geneva Conventions 1977

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Parental Negligence and Child Abuse

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Abstract

Children are innocent and vulnerable hence protection must be provided for them. Obligations to protect child rights is crucial to all members of the society; who may be either policy makers, public servants, parents, teachers, ordinary citizens or children themselves. However, child abuse prevails in today's society and children are at risk. Therefore, the objective of this research is to enhance knowledge on child rights, inculcate a sense of commitment in parents and community as a whole and to discuss child abuse prevention methods to uphold and protect child rights.

Despite the existence of rights, children suffer from poverty, homelessness, abuse, neglect, preventable diseases, and unequal access to education and justice systems that do not recognize their special needs. Hence, child rights are not respected within the family, even though family is considered as the primary caretaker in promoting the best interest of the child. Furthermore, although child rights are said to apply equally, irrespective of gender discrimination, girls are denied many rights. In times of war children are being forced to fight. War is not the only time when children are at risk. Everyday thousands are trafficked into the sex trade or forced to work long hours in dangerous conditions. Due to the civil war that took place over 30 years in Sri Lanka and due to the agricultural economy, rural poverty has increased. Consequently, the government engages in the promotion of external labour migration of women. This economic strategy has had a direct impact on the sexual abuse of children. This project will examine the issue of child abuse within Sri Lankan families, factors that contribute towards child abuse, mechanisms Sri Lankan Government has adopted to protect child rights and guidelines for identifying and preventing child abuse.

Child abuse or maltreatment constitutes all forms of physical and/or emotional ill treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power (World Health Organization, (1999), Report of the Consultation on Child Abuse Prevention). International community uses the word 'maltreatment' to explain abuse and neglect. However, within the Sri Lankan jurisdiction 'abuse and neglect' is used to explain acts or omissions that cause harm or threat of harm to a child.

In recognizing the special needs of children, the Convention on the Rights of the Child was drafted by the UN in 1990. The legal and policy framework on rights and protection of children in Sri Lanka has incorporated many international standards. Hence, Sri Lanka became a signatory to the Global Plan of Action for Children in 1991 and ratified the Convention on the Rights of the Child (CRC) in July 1991. Sri Lanka also ratified the Optional Protocol on Involvement of Children in Armed Conflict in 2000. In 1992, a Children's Charter was drafted for Sri Lanka in accordance with the CRC principles.

Further, the government has adopted various general measures to uphold the welfare and protection of children within a legal and political framework including;

developing and implementing National plans of action for children, creating the Ministry of Child development and Women's Empowerment, establishment of the National Child Protection Authority, establishing a special unit in the Attorney General's Department to deal with cases pertaining to child abuse and setting up of Women's and Children's Desk at Police stations.

The legislation of Sri Lanka relevant to child rights, child sexual abuse and commercial sexual exploitation includes: National Child Protection Authority ACT. No. 50 of 1998, Employment of Women, Young Persons and Children Act, No. 8 of 2003, Tsunami Special Arrangements Act, No 16 of 2005, Prevention of Child Molestation Act, No 30 of 2005, Prevention of Domestic Violence Act, No 34 of 2005 and amending the Penal Code (PC) for protection of children from abuse and exploitation. PC (Amendment) Act, No. 22 of 1995 and Act No 16 of 2006 provides for a strict legal regime to protect children and women from being subject to sexual exploitation and other vulnerabilities. As per section 363; consent is considered immaterial if the girl is under the age of 16. Further the PC (Amendment) Act, No. 22 of 1995 criminalizes Grave sexual abuse as per section 365B, Cruelty to children as per section 308A, Sexual exploitation of children as per section 360B, trafficking as per Section360C, soliciting a child (defined as under 18 years) within or outside Sri Lanka for 'the purpose of sexual abuse' as per section 360E and also Incest as provided in section 364A.

This research examines whether child abuse has rampant due to parental negligence and further examines as to why children continue to suffer abuse and neglect despite the domestic institutional commitments to protect children from violence. It is argued that child rights are not respected within the family, even though family is considered as the primary caretaker in promoting the best interest of the child. While addressing the research further it is argued that despite the domestic institutions established to mitigate the issue of child abuse in Sri Lanka, children are continued to be harassed and victimized due to a number of shortcomings of those organizations.

In the course of the research, statutory laws, books, reports, journal articles, articles of related publications will be studied in order to conceptualize and make an in-depth study of: child rights, risk factors for child abuse, consequences of abuse and neglect, and child prevention methods.

Keywords
Child abuse, Parental negligence, Best interest of the child

Comparative analysis of the existing legal regime applicable to lifting of corporate veil with particular reference to fraud; a case study

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Introduction

The Limited liability concept plays a major role in development of the economy of a country. It is great creation of Law[1]. In fact, this concept is adopted from the landmark decision in _Solomon v Solomon_[2]. According to the said case a Company is a legal person, either Directors or Shareholders will not be liable for actions of the Company. In these circumstances the question arises as whether who should indemnify the losses caused by a Company? Who will suffer the burden? That's why in Sri Lanka the law presumes corporate veil. What in effect is meant by corporate veil is that, there is a corporate veil between the Company and Directors as well as Shareholders. Although it is assumed that corporate veil is to protect Directors and shareholders from liabilities and responsibilities, there are many instances where court lifts the corporate veil in order to find out the real wrongdoer. As such, in following circumstances court will pierce the veil of incorporation;

1. In the interest of public and Public Policy
2. Enforcing Provisions under the Company's Act No 7 of 2017
3. Agency
4. Group and Subsidiary Companies
5. Fraud

This research is about how courts lift the corporate veil in instances of fraud and seeks to compare the jurisdictions of America and Australia in reference to Common Law and it was found that one of the major issues is the difficulty in identifying fraud in Companies and difficulty in defining what fraud really is. It is important to understand at this juncture as to how fraud has been defined. Fraud consists of some deceitful practice or willful device, resorted to with intent to deprive another of his right, or in some manner to do him an injury. As distinguished from negligence, it is always positive and intentional.[3]

Common Law

Companies have been using this concept of limited liability concept for eluding from their responsibilities. In Common Law, such activities of companies are defined as frauds. In the case of _Gilford Motors v Horne_[4], the corporate veil of J.M.Horne and Company was pierced because of breach of anti-competition contract, specifically in this case Court recognized as fraud when the Respondent attempted to avoid his responsibilities.

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1 Keren vanderkerchove, piercing the corporate veil 77 (Kluwer Law International 2007)

2 (1897) AC 22

3 Black's Law online Dictionary 9th Edition,

4 (1933) CH 935

Likewise, it is well established principle in the judgment _VTB Cpital PLC v Nutrietek_[5] that, Court can assume that there is fraud, when either Directors or Shareholders attempt to elude their liabilities on the name of Company and in such situations corporate veil can be lifted to give remedies to affected parties. In addition to this breach of fiduciary duty has also been taken as fraud by Court in the case _Trustor B v Smallbane_[6]

American Jurisdiction

Under American jurisdiction, if there is any fraudulent activities committed in Companies with the consent of incorporators of the Company, the corporate veil can be pierced by reason of that fraud. As such, it is crystal clear that when the incorporators allow fraudulent activities, the wrong doer is not the Company, the real wrong doer is either the Director or the Shareholder.[7] It is submitted that consent on the part of the Incorporators of the Company can be identified by following instances;

- Purposefully engaging in illegal activities
- Preventing public from taking benefits
- Manipulation of data
- Covering up fraudulent activities.

Therefore, in reference to those circumstances court will decide to pierce the corporate veil. [8] Also it is generally accepted that wrongful acts of a director with the knowledge of another director also amount to fraud for piercing the veil.

Australia Jurisdiction

It is submitted that under Australian jurisdiction, the corporate veil will only be pierced when Fiduciary and Legal duties are breached[9]. The excellent example for that is In _Re Neo Case_[10]

Sri Lankan

In Sri Lanka, it is submitted that it is very rare for court to pierce the corporate veil in reference to fraudulent activities of a Company. This is mainly owing to the difficulty in defining the term 'fraud'. However in the well-known Golden Key incident corporate veil was pierced by reason of fraud. Accordingly, the following issues were raised at the inquiry;

1. Whether the Financial Statement and Audit Report had been altered with the consent of Board of Directors.

2. Whether in past four years they conducted any Board Meetings.

3. Although Company was at a loss, whether the Financial Statement and Audit report

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5   (2011) EWHC 3107

6   (2001) 1 WLR 1177

7   Simmons Creek Coal Company v Doran (1892) 142 US 447

8   United States v Milwaukee Refrigerator Transit Company 145 F 1007 (1907)

9   Dennis Wilcox pvt ltd v Federal Commissioner of Taxatwin (1988) 79 ALR 267

10 Bar Association Law Journals (2013) vol. xx pg 90

had been manipulated to show profit.

4. Whether the signature of Auditor was forged.

5. Whether the amount of money which given to the Director of Ceylinco Insurance had been deposited at his own Bank Account.[11]

It was concluded that the wrong doings was done either by Directors or with the consent of the directors.

Conclusion

As such it is submitted that by giving an appropriate definition to the word 'fraud, court may pierce the corporate veil in order to protect innocent parties who deal with Companies. Further to the above analysis, it is understood therefore that activities of a company that amounts to cheating, elude their responsibilities, wrong doing done with the consent of the incorporators and instances of breaches of fiduciary and legal duties are possible circumstance under which Corporate veil may be pierced as piercing the veil is very much a discretionary power of the Court. Furthermore, following changes to the existing legal regime is suggested;

1. Section of 187(1) of the Company's Act No 7 of 2007 sets out the Fiduciary duties of Directors. Similarly, the said Act can be amended to include provisions to hold the Directors liable when they breach fiduciary duties by using name of the Company.
2. The procedure for incorporation of Companies must be followed strictly.
3. The term 'fraud' must be defined.

As such it is concluded that although Limited liability is a concept that is very important for growing economies, one cannot act without lifting the corporate veil in order to protect the innocent parties and to give them remedies for the losses that they have suffered. It is therefore the responsibility of the courts through their judicial activism to strike a fair balance between these requirements.

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11 www.sundaytimes.lk/090111/financialTimes/ft321.html accessed on 22nd of September 2018 at 7.22 Pm

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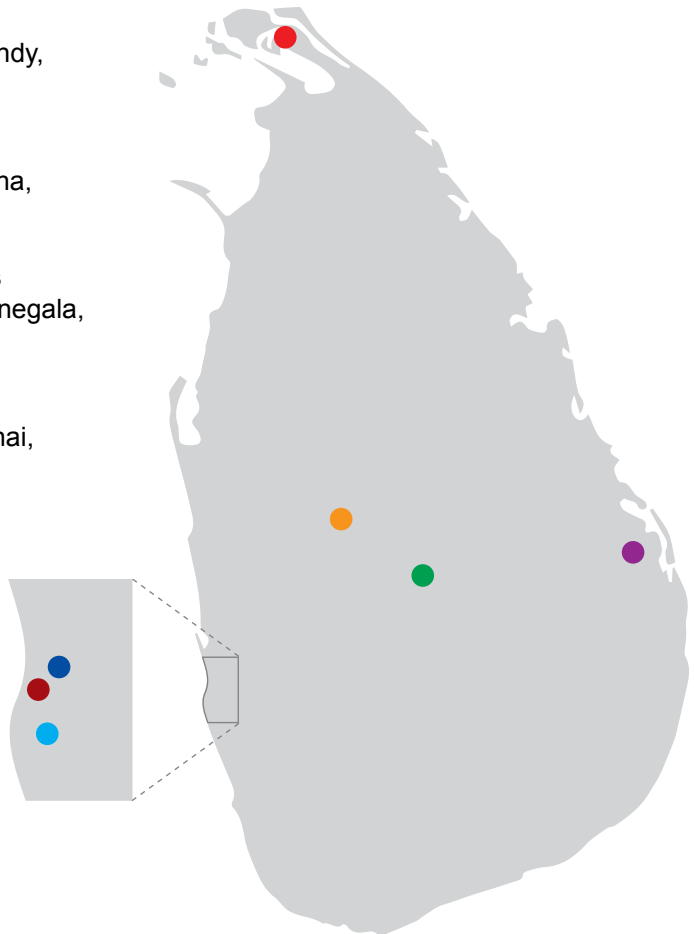
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BCAS ANNUAL RESEARCH SYMPOSIUM 2018 - GLANCE PROGRAMME

Time	Programmes
09.00 – 09.30	**Registration and Tea**
09.30 – 11.00	**Inauguration**
11.00 – 01.00	**Research Presentation Sessions**

Time	Session 1	Session 2
11.00 – 11.15	**Investigating the Factors Affecting Digitization of Retail Banking Services on Customer Satisfaction in Colombo, Sri Lanka** *Shandhya Parameswaran, British College of Applied Studies, Colombo, Sri Lanka*	**Efficiency of a Web Application in Eliminating Middle Brokers while Buying and Selling Crops for Sri Lankan Farmers** *M Nuzarath, British College of Applied Studies, Kandy, Sri Lanka*
11.15 – 11.30	**Remittance Expenditure Patterns: A Case of Remittance Beneficiaries in Wattala, Sri Lanka** *WMCS Jayaweera, Department of Bio Systems Technology, Faculty of Technology, University of Ruhuna, Sri Lanka*	**Effectiveness of Migrating to Open Source Based Operating System from proprietary Operating System.** *SHM Shafeer, British College of Applied Studies, Kandy, Sri Lanka.*
11.30 – 11.45	**The Impact of Motivation Factors on Employees' Turnover Intention in the BPM Contact Centre Industry of Sri Lanka** *Ayshathul Shyam Thahir, British College of Applied Studies, Colombo, Sri Lanka*	**Effectiveness of Paying Electricity Bill through Smart Card** *Ramzy Mohamed, British College of Applied Studies, Kandy, Sri Lanka*

Session 3	Session 4
Health care system for University Student in Sri Lanka to minimize dehydration, alcohol and drug abuse. *Audry Perera, BCAS Campus, Kandy, Sri Lanka*	Women Employee in Construction Industry; Challenges and Issues as a Quantity Surveyor in Sri Lanka *CD De Silva, BCAS Campus, Mount Lavinia Sri Lanka*
A Genetic Algorithm to Generate Optimum School Timetable for Sri Lankan Government Schools WBPK Roshan, British College of Applied Studies, Kandy, Sri Lanka	Recycled Concrete: Investigating the Strength of Recycled Aggregates *Akila Perera, Ahamed Yakoob Mohamed Nowfer and Hashan Rathnayake, Mount Campus, British College of Applied Studies*
Futuristic Communication System for Elderly People (FUTURCON) *Mohamed Fahmy Niyaz, British College of Applied Studies, Kandy, Sri Lanka.*	**Consequences of Time over Run In Residential Type of Construction Projects in Colombo District over the Period of 2017 – 2018** *Thanushan Thanabalasingam, Mount Campus, British College of Applied Studies*

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Time	Session 1	Session 2
11.45 – 12.00	**The conceptual study sexual harassment at workplace in Sri Lanka.** *R Vivek, Faculty of Business studies, Vavuniya campus*	**Factors Influencing Cloud Computing Adoption in Higher Education System: An empirical study based on the Universities and Higher Educational Institutes in Sri Lanka** MRF Sajidha and MJF Inshira, *British College of Applied Studies, Kalmunai, Sri Lanka*
12.00 – 12.15	**Impact of Celebrity Endorsement on Consumer Purchase Intention: A Study in Sri Lankan Fairness Products Industry** *L Liyanapathirana, British College of Applied Studies, Colombo, Sri Lanka*	**Development of 3D Rubik's Cube Game** *KASJ Arachchige and AAM Akram, British college of Applied studies, Colombo, Sri Lanka*
12.15 – 12.30	**Investigating the impact of effective leadership on employee performance in Business Organizations, Colombo, Sri Lanka** *K Sanjeevan and A Shimaz, British College of Applied Studies, Colombo, Sri Lanka*	**Effective Analysis for using anti-virus software's on Windows Operating System.** *SHM Shafeer and NM Naashif, British College of Applied Studies, Kandy, Sri Lanka.*
12.30 – 01.30	**Lunch**	
01.30 – 02.00	**Keynote 1**	

Session 3	Session 4
Expert System to Search Family Relationships Through a family tree *G Arunath and F Sajwa, British College of Applied Studies, Kandy, Sri Lanka*	**The Impact of Service Quality on the Selection of Private Educational Institutions in Sri Lanka** *CD De Silva, BCAS Campus, Mount Lavinia Sri Lanka*
How far the awareness of Calorie consumption of an individual leads to maintain a healthy body. *Thilochana Rangamaarachchi, British College of Applied Studies, Kandy, Sri Lanka*	**Impact of Parents' Involvement for Effective Student Progress** *G Arunath, T Rangamaarachchi and MRM Ruzny, British College of Applied Studies, Kandy, Sri Lanka*
Survey of Hygiene habits of Urban Sri Lankans in Wellewatte Colombo, and Anti-microbial properties & Safety of popular Hand-Wash/Sanitizer brands *RID Abeysinghe and WSM Fernando, British College of Applied Studies, Colombo, Sri Lanka*	A study of use of defense styles among university students *AR Kumaranayake, British College of Applied Studies, Kandy, Sri Lanka.*

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Time	Session 1	Session 2
02.00 – 02.15	**The impact of ethical business practices towards consumer purchasing intention: a study of the Sri Lankan retail fashion market** *NU Ariyasinghe, British College of Applied Studies, Colombo, Sri Lanka*	**Centralized web based and geo location-based charity management System** *KASJ Arachchige and MA Ahkam, British college of Applied studies, Colombo, Sri Lanka*
02.15 – 02.30	**Impact of Employee Satisfaction on Employees Performance in Sri Lanka's Software *Industry*** *N Jezeem Aymen, British College of Applied Studies, Colombo, Sri Lanka*	**Comparative security analysis for various smartphone Operating System** *SHM Shafeer and MAA Aasadh, British College of Applied Studies, Kandy, Sri Lanka*
02.30 – 02.45	**Effectiveness of extracurricular activities in studies of students.** *Thilochana Rangamaarachchi, British College of Applied Studies, Kandy, Sri Lanka*	**Application of 'Machine Learning Technique' in Pharmaceutical Drug Stock Simulation** *HO Fonseka, School of Engineering, British College of Applied Studies, Colombo, Sri Lanka*

Session 3	Session 4
Anti-fungal activity of Betel leaf extract against stem-end rot disease of papaya during cold storage *F Rizana Shiraz, Centre of Excellence for Postharvest Biotechnology, School of Biosciences, University of Nottingham Malaysia Campus, Jalan Broga, Semenyih, 43500, Selangor, Malaysia*	**A Critical Analysis on the Adequacy of the legal framework in reference to voting rights of differently abled people in Sri Lanka; with special reference to blind people** CB Alahakoon, *British College of Applied Studies, Colombo, Sri Lanka*
Serum creatinine levels and its relationship to blood pressure in chronic kidney disease of unknown aetiology (CKDu) patients in Kebithigollewa, Sri Lanka. *WMCM Weerasinghe[1], Nishantha Kumarasinghe[2], [1]British College of Applied Science, [2]University of Wolverhampton.*	**A Critical Evaluation of the Role of International Humanitarian Law and ICRC in Respect of the Protection of Children Effected by International and Non-International Armed Conflicts.** *WWASP Fernando, British College of Applied Studies, Colombo, Sri Lanka.*
Investigation of anti-inflammatory activity of *Rauvolfia tetraphylla* using *in vitro* protein denaturation assay *PM Fernando[1], WD Ratnasooriya[2] and RN Pathirana[3], [1]British College of Applied Studies, University of Wolverhampton, [2]General Sir Kotelawela Defence University*	***Parental Negligence and Child Abuse*** *D Manjula Baranage, British College of Applied Studies, Colombo, Sri Lanka, University of Wolverhampton*

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Time	Session 1	Session 2
02.45 – 03.00	**Challenges Confronted by the Undergraduates Offering English Medium Instruction in Sri Lanka** *AB Fathima Rinosa, British College of Applied Studies, Kalmunai, Sri Lanka*	**Cloud based business continuity and disaster recovery solution to protect on premise server workload** *KASJ Arachchige and Shakir S Moulana, British college of Applied studies, Colombo, Sir Lanka*
03.00 – 03.15	**The Impact of Brand Equity on Customer Purchase Intention: A Study in Homecare Products in Sri Lanka** *VT Karunarathne, British College of Applied Studies, Colombo, Sri Lanka*	**Impacts of Different Types of Vulnerability on Mobile Phone Passwords** *MR Ramzy Mohamed and MI Aysha Ilma, British College of Applied Studies, Kandy, Sri Lanka*
03.15 – 03.30	**Impact of Social Media on Academic Performance of Undergraduate: A Literature Review** *Ahamed Rameez Mohamed Nizzad, Department of Computing, British College of Applied Studies, Kalmunai, Sri Lanka*	**Route Traffic Signal Controlling Using Congestion Based On Analyzing Traffic Density** *M Zumaiya and R Vijayakumar, British College of Applied Studies, Kandy, Sri Lanka,* *Eastern University, Sri Lanka.*

Session 3	Session 4
Comparison of Cefoxitin Disc Diffusion Test and PCR for mecA, PVL and femB Genes for Detection of MRSA *SJ Wijekoon[1], NP Senanayake[2], N.S.Chandrasiri[3], H.M.S.Karunaratne[4], H Abeygoonawardena[4] and S Fernando[1], [1]British College of Applied Studies, Colombo Sri Lanka , [2]Faculty of Medicine, University of Colombo, [3]Department of Microbiology, Colombo South Teaching Hospital , [4]Faculty of Medicine, General Sir John Kotelawala Defence University*	**Comparative analysis of the existing legal regime applicable to lifting of corporate veil with particular reference to fraud; a case study** *Sainul Abdeen Kifsiya Banu, British College of Applied Studies, Colombo, Sri Lanka.*
Evaluation of *In vitro* anti-inflammatory activity and the phytochemical profile of *Canavalia ensiformis* and *Eclipta prostrata*. *S Kannadas[1], WD Ratnasooriya[2] and RN Pathirana[3], [1]British College of Applied Studies, University of Wolverhampton, [2]General Sir John Kotelawala Defence University*	**Use of High-Specification Observation Camera and What will be the effect on traffic violations?** *MR Ramzy Mohamed and Hisham Hafeel, British College of Applied Studies, Kandy, Sri Lanka*
Assessment of the prevalence of lymphatic filariasis among school children in Ratmalana area using *Wuchereria bancrofti* SXP-1 antigen specific ELISA method. *K Ekanayake[1], PH Premaratne[2], TC Yahathugoda[3] and WSM Fernando[1],* *[1]British College of Applied Studies, Colombo Sri Lanka, [2]Faculty of Medicine, General Sir John Kotelawala Defence University, [3]Faculty of Medicine, University of Ruhuna*	**Systematic Review of security Vulnerabilities on web-based application** *MAM Imamdeen and WGPK Roshan, British Collage of Applied Studies, Kandy, Sri Lanka*

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Time	Session 1	Session 2
03.30 – 03.45	**Impact of Social Media in Divisional Secretariat Offices in Ampara District** *K Mohamed Ishraque, British College of Applied Studies, Kalmunai, Sri Lanka*	**Implementing Keystroke Dynamics as a Multi-Factor Authentication in Passwords to Minimize Security Vulnerabilities** *NF Nuzrah and WGPK Roshan, British College of Applied Sciences, Kandy, Sri Lanka*
03.45 – 04.00	**Standardized and a holistic Early Childhood Education Curriculum** *K Kanagarajh, British College of Applied Studies, Colombo, Sri Lanka*	**Intelligent Street Light System using Image Processing** *IF Shahlina, Department of Computing – BCAS Campus, Colombo, Sri Lanka*
04.00 – 04.30	**Keynote – 2**	
04.30	**Closing Ceremony and Tea**	

Session 3	Session 4
Variation of Blood Pressure and Urine Albumin in CKDu patients in the North Central Region of Sri Lanka *RF Rizkha[1] and Nishantha Kumarasinghe[2], [1]British College of Applied Studies, Colombo, Sri Lanka, [2]Sir John Kothalawa Defense University, Rathmalana, Sri Lanka.*	**Minimizing Security Vulnerabilities using Router Technologies in a Computer Network** *SHM Shafeer and Nakesh Visvanathan, British College of Applied Sciences, Kandy, Sri Lanka*
Assessment of limitations of broth Micro dilution for susceptibility of Vancomycin against MRSA *Shazma Hiflan, BNP Senannayake, and CH Abeygoonawardena, [1]British College of Applied Studies, [2]General Sir John Kotelawala Defense University, [3]University of Wolverhampton)*	**Expert system to give warnings and precautions on the impact of social media usage** *G Arunath and F Shazna, British College of Applied Studies, Kandy, Sri Lanka*

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