In Search of Stimulative Technologies

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Young Business Technology & Entrepreneurial Researchers (YBTIER)
Department of Commerce and Financial Management
University of Kelaniya
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Preface

Technology adoption is the most fundamental requirement of a country to move towards positive technological development. Along the journey to achieve technological development, countries need to accept the technologies already available elsewhere in the world before developing local technologies. Technology adoption always works as a stimulator for the local technological innovations. Young Business Technology and Entrepreneurial Researchers (YBTER) are the combined research group which consists of final year undergraduates from Business Technology and Entrepreneurship study streams of Department of Commerce and Financial Management. The aim of the YBTER congress 2012 is to re-introduce the available technologies, which have not been successfully adopted in Sri Lanka. The technologies to be discussed in this congress are not unknown innovations in the world and some of them are already known and well established technologies in the market. Further, some of the technologies introduce in this proceeding may have partially utilized in Sri Lanka and hence, the readers may feel that these technologies are not new and innovative; however, through this congress, authors expect to introduce new avenues of applying available state of the arts technologies in Sri Lanka. This will discuss the success stories of adoption and application of innovative technologies in different industries in other countries, where Sri Lanka has shown serious limitations in finding innovative solutions. Hence, this congress proceeding is expected to stimulate the readers awareness of missing technologies in Sri Lanka and allow them to re-think of best adoptive strategies to implement these technologies in Sri Lanka.

C.N. Wickramasinghe
Editor in Chief
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Acknowledgements

As far as this is the pioneering attempt to organize a undergraduate students' academic event in the Department of Commerce and Financial Management, we had to face enormous challenges on the way through. However, with the help of so many people around us, we were able to overcome all the barriers came towards us. Therefore, the YBTER Congress 2012 is an outcome of genuine effort of so many people who work with us. There are many individuals who helped us to make this event success. First our sincere thanks goes to Mrs. Sunethrani Amarathunga, former head of the Department for her valuable support for this event and all other events organized by the Association of Business Technology. We are also thankful to Dr. D.M. Semasinghe, head of the Department of Commerce and Financial Management for the invaluable support given to make this event successful. Further, our sincere gratitude goes to Dr. (Mrs.) R.P.C. Ranjani, Dean, Faculty of Commerce and Financial Management for her encouragement and support given on this to make it success. Our sincere gratitude also goes to all the lecturers at the Department of Commerce and Financial Management for their valuable contribution as the members of editorial board of the conference proceedings. Last but not least we are thankful to all the Business technology and Entrepreneurship final year and third year students and non academic staff of the DCFM for their contributions, commitment and enthusiasm to make YBTER congress 2012 a reality.

YBTER 2012 Organizing Committee

Message from Congress Chair

It is with great pleasure that I pen down these words as the Congress Chair of the inaugural "YBTER Congress 2012". The "YBTER Congress" is the first ever Undergraduate Student congress held in the University of Kelaniya and as a scholar it is an opportunity to be associated with an event of this nature in which the objective is to survey on technological transformation in Sri Lanka by adopting existing innovative technologies.

Subsequent to a three decade war, we live in a time of resilience. This is an era where the coherence of economic, political and socio cultural aspects constitute a global system that is highly dynamic thus adds further impulsiveness. The "YBTER congress-2012" is providing an opportunity to Business Technology & Entrepreneur students to seek on latest, simulative technologies which emphasize in the world and its applicability in to solving social issues whilst providing both theoretical and practical experience on Innovation Management which lay its emphasis on, 'Change begins only from and within "Change" '.

In this tedious charge a special word of appreciation and gratitude is extended to subject lecturer of Innovation Management Mr. C.N. Wickramasinghe, and to the both academic and non academic staff of department of commerce and financial management for rendering a supporting hand in all possible ways to make this event a success.

In conclusion I wish YBTER congress a successful future endeavors.

Thimothy Pathum Kumarathunga
President
Young Business Technology and Entrepreneurial Researchers
Department of Commerce and Financial Management

Message from Head of the Department

It gives me a great please to issue this congratulatory message for the YBTER congress 2012 organized by the students of Young Business Technology and Entrepreneurship Researchers of the Department of Commerce & Financial Management, University of Kelaniya.

Technology has become very useful and important in our lives, organizations and country as a whole. Technological change has an unequivocal impact on economic growth and on the development of industries. In many industries technological innovation is now the most important driver of competitive process. Schumpeter—a great contemporary entrepreneurship thinker—asserts that technological discontinuities eliminates obsolete goods and services and production methods and newer and more advance products and services come into the market. He further argues that technological discontinuities stimulates economic development and is the engine of corporate growth and wealth creation.

YBTER congress 2012 opens our eyes regarding the importance of technology in wealth creation and economic growth under the present context of globalization and resource scarcity. Many articles presented in this conference highlight the fact that technology acts as the antidote to the resource scarcity of our society. They further contend that new technologies help to create new entrepreneurial opportunities which are indispensable to new venture creation. I hope that this congress will further advance our knowledge in technology and innovation. I wish all the success for this congress and highly commend the effort made by the staff and students to make this event a success.

Dr. D.M. Semasinghe
Head
Department of Commerce and Financial Management
University of Kelaniya

Message from Dean of the Faculty

The Young Business Technology and Entrepreneurial Researchers (YBTER) at Department of Commerce and Financial Management have put together pioneering undergraduate Student Congress in our Faculty this year. The topics to be covered during the course of this congress are of great importance to the future technological and economic development of Sri Lanka. I look forward to hearing their new technologies and recommendations on how to resolve many complex problems involved in assuring the technology development in Sri Lanka.

The success of our faculty comes from our highly competent and dedicated students and the professionalism and expertise of our lecturers. As a faculty, we truly focus on creating research based academic culture in the Faculty of Commerce and Management Studies. I hope that undergraduate student as the major stakeholder of the faculty can also contribute to make our mission a success. Therefore, YBTER 2012 will be the first step of long journey to enhance the academic culture among the undergraduate students of our faculty. If we can create more opportunities like YBTER 2012, we will be able combine the skills, competencies and knowledge of our two main resources to make Faculty of Commerce and Management Studies not only as the best faculty of University of Kelaniya, but also as the Best Management faculty in Sri Lanka.

I wish YBTER all the best for their congress 2012 and all the endeavors they are planning to execute in the future.

Dr. R.P.C. Ranjani
Dean,
Faculty of Commerce and Management Studies
University of Kelaniya

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Prologue: Why Sri Lanka Needs Stimulative Technologies

C.N. Wickramasinghe

Technology is generally defined as the making, using, and creating knowledge of tools, machines, techniques, crafts, systems or methods of organization in order to solve problems issues of the society. Technologies available to solve the existing problems evolve as discoveries, inventions or innovations. Discoveries are the recognition of the unknown realities of the world. Inventions are the developed ideas, which are novel, technically feasible and industrially applicable to solve the technical problems. When discoveries or inventions are developed as a marketable product, it is generally called as the innovation. Therefore, discoveries, inventions and innovations are part and parcel forms of technology, which can be used to solve everyday problems and issues faced by the people. Every person in the world has to face technical problems and issues; however every person does not have the creativity, capacity and resources to develop their own technologies to solve their own problems. This phenomena demands specialized groups of people and organizations who has such capacities to engage in technology development. Therefore the success of the technological discoveries, inventions and innovations has been generally measured by the societal utility created by the new technology.

Technology Dependency Theory and Emerge of Asia

Industrial development in the western countries achieved its highest status in late nineteenth century. However, such industrial development and increase of technological innovations had not explicitly in eastern countries. During this era world organizations

like World Bank have introduced technological dependence policies by asking less industrial countries to focus on their strengths in exporting raw materials, agrarian products while importing technical and technological products from western countries in return. Even though, this policy was based on the relative advantage theory, it has negatively affected on technological development of third world countries in the east.

Owing to the long lasted dependent strategy, technological development in South Asian, Latin American and sub-Saharan African countries has been very modest. Owing to the over emphasis given on agriculture and raw material supply, third world countries have fallen to economic dependency trap. However, countries like China, India, Singapore, Malaysia and Taiwan have shown significant deviation from been technologically dependent on industrial countries since late 1970s (Amsden, 1979). They tried to develop their own technologies and customize western technologies through reverse engineering to increase the affordability of the technologies by lower income groups of the society (Shie & Meer, 2010). Today they are going hand in hand with the western countries with improved economic and social standard by successfully integrating technological innovations to solve their economical, technical, social and environmental problems. They have proven that technological development is not a un- changeable disability of third world countries, but if there is strong determination and adoption of available technologies, any nation can develop their own technologies in a long run. At the beginning many developing countries are unable to develop new technologies to solve their problems; however, they still have to start adopting the already available state of the art technologies to solve their problems and improve the productivity.

Unfortunately, some countries are very slow in adopting state of art technologies already available in the world.

Technological Development in Sri Lanka

Business and industrial development in Sri Lanka is no way near the recent development in Asia and it is even lacking the intensity to make use of best practices already available in other parts of the world. India is the closest fast tacked technologically enabled neighbor of Sri Lanka. Even though Sri Lanka is situated near to India, technological adoption and technological innovations in Sri Lanka have shown significant deficiency. Most of the business activities and available solutions for socioeconomic problems seriously ignore the inputs that can be gained by the technological innovations. Consequently, the willingness and appreciation of developing local innovations in Sri Lanka are not in a very healthy status. Hence, not only creating technological innovations, adoption of available technologies in productivity improvement, businesses and social problem solving has shown very modest improvement. Telecommunication and finance sectors are the only sectors that explicitly adopt the state of the art technologies in local context without much delay. However, other industries are very slow in adopting state of the art technology innovations in Sri Lanka.

Why stimulative technologies?

Technology influences on every aspect of human life. It has rapidly changed the way things happened around the world. However, technology development and technology adoption have shown significant disparity among the developing nations. Some countries are very good in developing new, innovative technologies and some countries are good at reverse engineering. There are countries quickly

adopt the state of the art technologies in the problem solving efforts while some other countries are very slow in technology adoption.

Sri Lanka is slow in adopting the state of the art technology in business industries and socioeconomic problem solving efforts. Therefore, Sri Lanka is still in a stage where need to look for simulating technologies. In stimulation stage, a country needs to search and adopt the technological innovations already established elsewhere in the world. By simulating the existing technologies, less industrialized countries can increase their productivity and competitiveness. Once the productivity started to grow, it will rouse the in search of new ways to further improvements in productivity and competitiveness. Hence, the introduction of simulative technologies is the fundamental strategy for a country that can establish the foundation to be an innovative nation in long run.

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Transportation

"….Factor productivity is highly dependent on the efficiency of its transport system to move labor, customers and goods between multiple origins and destinations. The most important transport problems are often related to public transportation and these problems occurs when the transport systems, for a variety of reasons, cannot satisfy the numerous requirements of public mobility. Therefore, Transportation planners in developing countries face a number of problems that require innovative solutions. Large increases in urban population and pollution have seriously compromised existing transportation systems and significantly increased the challenge of creating future transportation systems…."

Dr. Jean-Paul Rodrigue

Japanese Electronic Reference Ticket (ERT) system as a Virtual Conductor in Sri Lankan Public Transportation Industry

Premarathna K.D.N
Udayanga A.M.A
Wjesuriya W.A.P.M.K
Perera K.P.S
Geethaka P.P

1. Introduction

Qualitative level of the public transportation procedure and methods within Sri Lanka is one the most debatable concerns among majority of the citizens. In usual practice, 75% of citizens are currently using the public transportation services, which can be referred as the passengers. Research findings indicate that these passengers could be split as 93% users of public buses, while the rest 7% uses the trains as their travelling method. Accordingly, it can be assumed that, majority of the Sri Lankan passengers are using buses for their daily travelling. Owing to the loosely regulated practices in both public and private bus industry, service quality, faith and the respect of the service have been seriously questioned in recent years. Especially the ticketing method can be considered as one of the major issues in Sri Lankan public transportation service.

2. Current bus ticketing system in Sri Lanka

Public bus service in Sri Lanka still uses the human resource: the conductors to issue ticket to the passengers. Apart from the role of issuing tickets, he is responsible of loading the bus to gain necessary profit for the bus owners. Due to the overwork of this second role, has become very unpopular among the passengers, where passengers find it very difficult their journey by bus. From the passenger's point of view, bus conductors are not providing any value addition for the

service required by the public transportation. As far as bus conductor's failure to attempt at a significant value addition to the passengers or to the service, his role may negatively affect the quality of the public transportation in Sri Lanka. Despite this major issue, there are other disadvantages of the current bus ticketing practice in Sri Lanka. As indicated bellow, currently Sri Lanka uses two traditional methods to issue bus tickets.

i. Ticket book system

This system is mainly used by the Sri Lanka Transport Board (SLTB). According to this system, conductor must be in the bus & also he has to write the travel cost on the ticket according to the distance a particular passenger wishes to travel. This system can be depicted as the traditional method of ticketing and this is now obviously out of date. Due to this, lots of issues & problems have raised from this current system. In order to avoid disadvantages of this manual ticket issuing process, it has been replaced with the manual ticketing machines. In this attempt SLTB first introduced the analog ticketing machines, and at present public and private buses are demanding to use manual electronic ticketing machines.

ii. Manuel Electronic ticket machine system

As long as this method of ticketing is considered, conductors enter data in to the ticket machine and issue a printed ticket to the passenger containing a lot of information regarding the journey of the passenger. The intention of this system was to prevent frauds and cheating of money by both the conductors and the passengers.

Figure 1: Analog and Manual Electronic Ticketing Machines

Therefore, as an internal controlling system, this is a relatively efficient system than the traditional ticketing system. However, this method was unable to reduce the cost or increase the quality of the service.

3. Disadvantages of current ticket issuing systems in Sri Lanka

i. Time consuming

To a conductor along with a machine, it takes a lot of time to write the amount, issue the ticket, collect money & give the balance.

ii. Cost

Owners need to spend money on conductor's salary, ticket stationary, and in many cases ticket checker's salary. Each extra cent incurs in ticketing, can be considered as a running cost and it finally adds to the traveling cost of the passenger.

iii. cash frauds

Sometimes there may be situations where conductors collect money without recording & issuing tickets or record lower amounts than the actual value, balance is not given back to the passenger and even in some cases conductors use duplicate ticket books. Therefore, as long

as this current ticketing systems are concerned, there are many possibilities for the frauds activities, with together a lesser chance of avoiding such frauds.

iv. Cheating by passengers

Sometimes some passengers are travelling without purchasing tickets, or else travel a longer distance than the distance mentioned in the ticket. Considering all these factors, owners of the buses might unable to achieve the required return and the measures that take to increase the return and that might result as overloading the bus which may harmful for the passengers.

v. Inconvenience to implement & maintain

Conductors have to issue tickets & collect money while the bus is on the journey and it may be a huge inconvenience for both passengers and conductors.

Therefore, considering the public transportation system, Sri Lanka has failed to adopt the state of art technology in transportation industry. However, other Asian countries such as Japan, China, Singapore and Malaysia have adopted this technology ensuring efficiency of bus ticketing systems. Therefore, if Sri Lanka also can step forward to adopt some sort of technologies, which can be considered as state of the art for the ticketing system, public transportation service will be able to overcome the above mentioned issues and also passengers will be able to obtain so many advantages from the improved quality of the service. Even though, the technology has developed substantially at least Sri Lanka need to concentrate on more realistic and practical technological alternatives that have been successfully implemented in similar countries.

3. Electronic Reference Ticket (ERT) Technology

The **Electronic Reference Ticket (ERT)** technology was introduced by Japanese and with this system conductor's role has been replaced by the computerized machine. When a passenger gets in to the bus he/she needs to collect the reference ticket issued by a machine (Figure 02). This reference ticket indicates the passenger's seat number as a reference number. Computer system can detect the available seats in the bus and assign vacant seats to passengers. There is a display near the driver and it shows the fare according to passenger's ticket number. When the passengers are seated in their assigned seats, they can see the fare they need to pay when they get down the bus. Fare increases automatically while travelling on route and passenger can see how his/her fare increases through the digital display board.

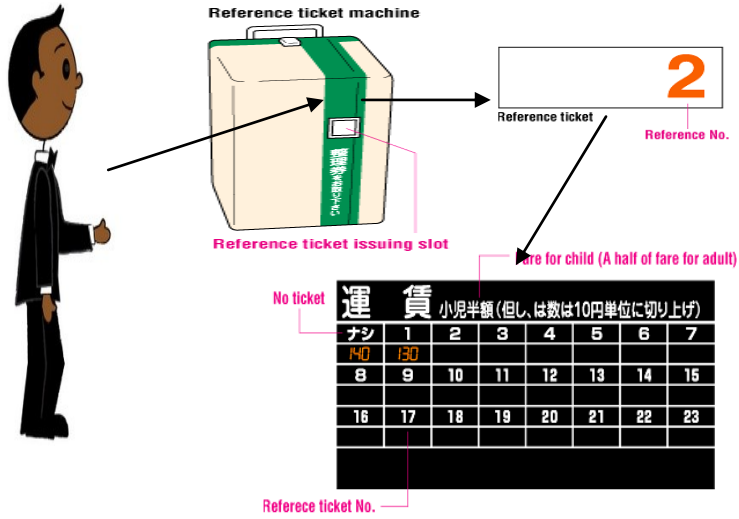

Figure 02: How the ERT system works

When the passenger wishes to get down from the bus, he/she has to press the "STOP" button. The passenger can see the fare on the display board.

Collect money from the passenger, there is a money collecting machine near the exit door. Passenger has to enter his/her reference ticket and insert the relevant fare as coins to the money collecting machine, which is displayed by the money collecting machine. The modern money collecting machines are very smart. It can return the correct balance depend on the amount you insert into the machine. However, there are machines that cannot give the balance back to the passenger. In those buses, there is another machine to change notes to coins. In ERT system, if a passenger does not insert the sufficient amount of money, the exit door will not be opened and the passenger needs to contact the driver to solve the issue.

The ERT system is a combination of small machines located in front of the bus. Traditional ERT system consists of four kinds of machines to run the ticket issuing process.

2. Reference ticket issuing Machine

3. Fare display board

5. Money collecting machine

6. Coin changing machine

Since all the machines are located close to the driving seat, it is easy to consult the driver directly to get his/her assistance. If passenger needs assistance he/she can consult the driver directly. Therefore, there are no any confusions and time delays to the technology.

4. Conclusion

Owing to the technology involvement in ERT system, installation of ERT system will initially generate a substantial cost to the public transportation industry in Sri Lanka. However, this will be a onetime cost that can overcome all the disadvantages of the existing ticket issuing system in Sri Lanka. As far as the objective of the public transportation service is considered, it is to provide excellent service to the passengers at a low cost. Therefore, replacement of the physical conductors with the virtual ERT conductor will provide long-term benefits to the Sri Lankan transport industry. Even though ERT system is explained mainly focusing on bus transportation, also this system can be extended to railway transportation. Therefore, government and private bus owners can implement ERT system to gain long-term benefits and excellent service to the Sri Lankan citizens.

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Hybrid Trains to Sri Lanka: Why only Hybrid cars How about Hybrid Trains?

Pradeep K. Jayasekara
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Nuwan S. Rathnayaka
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Anusha S. Srimali

1. Introduction

Transportation is one of the major factors that indicate country's development. It depends not only on transportation media, but also the efficiency of transportation. At present there are lots of modes of transportation around the world. Developed countries are using advanced ways of transportation like Jets, Electronic buses, Hybrid vehicles, Electronic trains, Ships etc. But developing countries still limited to traditional transportation mediums such as buses and railways.

When considering the mode of transportation a country has to concentrate on several factors. Most important thing is the efficiency, because it is one among many factors which decides saves time and cost saving. In the meantime service providers need to consider the flexibility and feasibility of the media. In this article authors intend to discuss about possibility of implementing Hybrid Electronic Trains as a mode of transportation in Sri Lanka to increase the efficiency in point to point travelling.

The underline problem that drives this paper is the inefficiency of the current modes of transportation in Sri Lanka, which do not provide valuable travelling experiences for the citizens. As a developing

country Sri Lanka needs an accelerated transportation system which can contribute to its development process. The main objective of the public transportation system is to provide point to point traveling facilities to people and goods with appropriate speed and right cost; however, most of the time public modes of transportation in Sri Lanka are unable to fulfill this objective successfully. That's why it is necessary to introduce modern technological solution to the transportation industry in Sri Lanka.

2. Situation in Sri Lanka

Point to point travelling is the most frequent action in human life. Unlike early days in the society, today people tend to travel longer distances in their daily life. Public transportation is necessary to move people who do not have their own private vehicles to travel form their working places to residencies. Further transportation is important to move raw materials as well as finished goods quickly and securely among markets.

Currently, in Sri Lanka, commonly used public transportation mediums are buses and Trains. However, both of these systems are not up to the standard level, when compared to industrial third world countries. When considering the current transportation system in Sri Lanka, above functions are not performing well. Owing to the inefficiencies of the mediums, time and money of people are wasted. Also moving of goods is made in a way that the value of those goods will become loss. Such losses normally added to the price of the good and hence, people need to pay more on the goods they want to purchase. As far as both public transportation mediums are using diesel as the fuel, oil price increases directly influence on the cost of traveling by public transportation. Therefore, Sri Lankan public transport sector need to search for modern technological solutions

that can increase the efficiency of public transportation. Most of the emerging third world countries have introduced electric trains as a solution to increase the efficiency of railway transportation. However, Sri Lanka is not yet introduced the electric trains as a long term solution for the gradually worsening public transportation problem in Sri Lanka.

3. History of the Technology

The world's first electric train was designed by a German scientist, Werner Von Siemens. It was presented at an international trade exhibition in Berlin in 1879. A Special track was built for the train which can carry up to thirty visitors at a time around the exhibition. One of earliest open land electric railways in England was Volk's Electric Railway built along the sea-front at Brighton. This railway was opened in 1883 (Fact Book, 2007).

Even though electric train was invented in 1800s it has not spread all over the world as the diesel engine, due to the high initial cost; however, in the last 20 years there has been a gigantic acceleration in electric railway traction development. This has run in parallel with the development of power electronics and microprocessors. What have been the accepted norms for the industry for, sometimes, 80 years, have suddenly been thrown out and replaced by fundamental changes in design, manufacture and operation. Many of these developments are highly technical and complex. Today there is a wide variety of electric traction systems around the world, which have been built according to the type of railway, its location and the technology available at the time of the installation.

The electric trains have proved to be a more efficient and cost effective option compared to the earlier steam engines. The electric trains today are much superior to its earlier counterparts as they have been

improved upon to keep up with the changing times. As a result of using electricity to power the engine make the train super fast. Further, they are environment friendly as they do not cause any pollution. Electricity being power sources for electric trains it works out cheaper for not only for those who operate it but also those who use it for traveling. Due to the convenience and comfort that it offers the electric trains have gained popularity as the chosen mode of transportation of the majority.

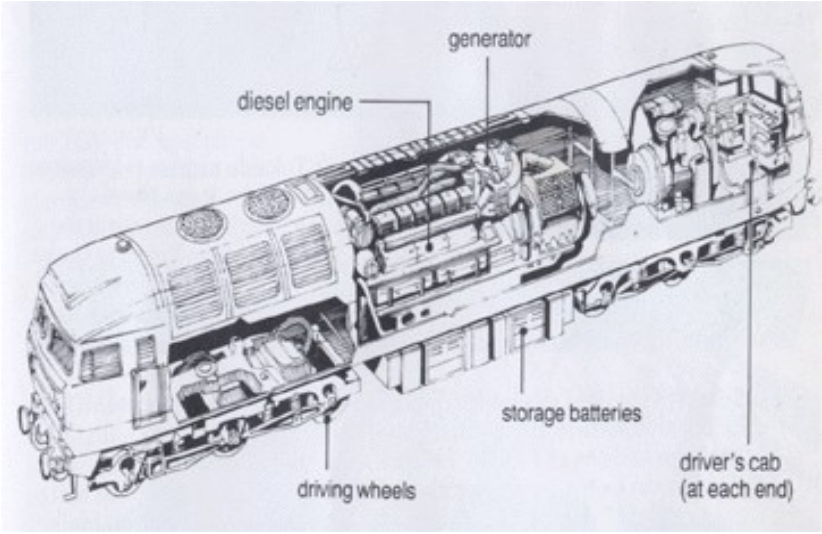
The fundamental difference of electric train from traditional trains is that electric train is a train that runs by electricity, rather than the diesel. The electricity that is used to power the train can be generated from any external sources such as diesel, hydro power, or even nuclear power. Generally, in electric train system, required electricity to power the engine is transmitted through overhead cables, in-built batteries or installed third rail. In electric railway engines, traction is attained by DC (Direct Current) Series Motors. On non-electrified tracks, Power stored in the batteries, ultra capacitors or in built diesel generators generate electrical power and feed to the motors. There are several different electrification systems are used throughout the world; however as every electric train system, the electric railway needs a power supply that the trains can access at all times. Therefore, there was a need for hybrid locomotive that can minimize the disadvantages of both diesel and electric trains. Japanese and France companies accepted the challenge and they have successfully developed the hybrid trains, which are more efficient than any other train in the world.

4. How Hybrid Electric Train Technology works?

In every traditional diesel train engine, there is a diesel-electric transmission. Diesel engine provides power to the generator to

generate electricity to run the wheel motors. So as in electric trains, diesel-electric trains need diesel to run the train.

A hybrid train is a train that uses an onboard rechargeable energy storage system (RESS), located between the power source (diesel engine prime mover) and the traction transmission system connected to the wheels.



In hybrid train, diesel engine works as the primary power source to give force to the train to move, surplus energy is used to recharge the energy storage in the engine. Then, the electric energy stored in the batteries activates the electric motors that can accelerate the train run. Using a battery storage system means that a non-fully electric train can use dynamic braking. Even train can shut down the main power source whilst idling or stationary. Reducing energy consumption in hybrid trains provides environmental benefits and economic savings for the developing countries like Sri Lanka.

5. Conclusion

Even though the electric engine is much more efficient than the diesel engine, it needs to have a continuous external power supply to run the train. Hence, on the rail road that does not have external electric supply these electric trains cannot be run. Considering Sri Lankan economy, at least in short-run the initial cost of the electric train may not be tolerable. Electrification requires an entire new infrastructure to be built around the existing tracks at a significant cost. Costs are especially high when tunnels, bridges and other obstructions have to be altered for clearance. Therefore hybrid train would be the suitable option for Sri Lanka. Since most traditional diesel engines are diesel-electric, they have all the components of a series hybrid transmission except the storage battery, making this a relatively simple expectation.

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Monorails to Prevent Traffic Jams in Colombo

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W.A.H.G.Harsha Lal

1. Introduction

Are you always behind schedule.....?

Are you always late for, office or to school or any other occasions?
Were you able reaching your destination as scheduled..?
How is it like to travel around the Colombo city on a week day during peak hours...?

As urban populations get bigger and city roads become increasingly congested, city planners need comprehensive urban development and transport policies to deal with deep-seated social and demographic change.
Effective policies must meet multiple objectives; such as;

- Strike a balance between different modes of transport: pedestrians, bicycles, motorcycles, cars and public transport,
- Provide security, safety and optimum service for transport system users,
- Uphold the mobility that steers economic development,
- Reduce urban pollution caused by motor vehicles.

Alongside longer-term solutions such as upgrading public transport systems and introducing city centre road toll systems, high

performance traffic management systems can be crucial to the success of a city planning and transportation policy.

Traffic management typically produces a better combination of travel security and efficiency. Events which disturb the flow and may cause traffic to worsen into a disorganized chaos, which include: road construction, accident and rubbish on the road. On particularly busy roads, a minor disruption may persist in a occurrence known as traffic waves. A complete breakdown of organization may result in traffic jams and gridlock.

2. Situation in Sri Lanka

Colombo being the main commercial city of Sri Lanka is the hub for businesses as well as private businesses establishments. The number of vehicles entering the city has increased rapidly over the past recent years. There are many major causes which have led to the traffic congestion in Colombo city. One of the main reasons for the congestion is the insufficient and inefficient public transportation system which is currently under way. Also deficiencies in the road network are one of the key factors. Roads being not up to the standard, less maintenance of roads, less number of lanes, not having turning and filter lanes, absence of over and under passes have contributed towards the congestion. Bottle necked bridges and narrow roads also create heavy traffic. The attitude of the motorists towards the rules and regulations also a major cause for congestion.
The most important factor is the weaknesses in city planning which creates congestion by not separately locating commercial areas, office areas and residential areas and lack of parking spaces within the city which cannot cater the traffic. On other hand, road infrastructure in Colombo city and its suburbs cannot be further widened or new roads built keeping with the rate of demand created by people who are

shifting from public transport to private transport. It is impossible to obtain the required land for road space, parking spaces etc. They are fast becoming constrains that are severely restricting the flow of vehicles which far exceed the capacity of the road system to efficiently discharge the demand.

However, one of the major issues concerning traffic congestion is the lack of awareness and the negative attitude towards abiding road rules by the public. Pedestrians not using yellow crossings, vehicles being parked at no parking zones and improper disposal of garbage on roads are a few common examples.

Pioneers of technology came up with many solutions and recommendations as to what the Traffic Board can actually do to control/reduce the fast growing traffic problem in Colombo. One of the recommendations is to increase railway station/ train cabin facilities. Another recommendation that we have come up with is to replace old train machines with new machines. Another recommendation was to get rid of the deteriorated vehicle so that the people could get a safer and a comfortable drive.

3. History of Monorail

A monorail is a rail-based transportation system based on a single rail, which acts as its sole support and its guide way. The term is also used variously to describe the beam of the system, or the vehicles traveling on such a beam or track. The term originates from joining the words mono (one) and rail (rail). Hence, the term "monorail" is often used erroneously to describe any form of elevated rail or people mover. In fact, the term solely refers to the style of track, not its elevation.

The first monorail was made in Russia in 1820 by Ivan Elmanov. Attempts at creating monorail alternatives to conventional railways have been made since the early part of the 19th century. The earliest patent was taken out by Henry Palmer in the UK in 1821, and the design was employed at Deptford Dockyard in South-East London, and a short line for moving stone from a quarry near Chesnutt, Hertfordshire to the River Lea. The Chesnutt line is notable as it was the world's first monorail to carry passengers, as well as the first railway line to be opened in Hertfordshire.

From the 1980s onwards, with the rise of traffic congestion and urbanization, monorails have experienced resurgence in interest for mass transit usage, notable from the early use by Japan and now Malaysia. Tokyo Monorail, the world's busiest monorail line, averages 127,000 passengers per day and has served over 1.5 billion passengers since 1964. Monorails have also seen continuing use in niche shuttle markets, as well as amusement parks.

Modern mass transit monorail systems have settled on developments of the ALWEG beam and tyre approach, with only two suspended types in large use. Monorail configurations have also been adopted by maglev trains.

4. How the Technology Works

A monorail is a rail-based transportation system based on a single rail, which acts as its sole support and its guide way. The term is also used

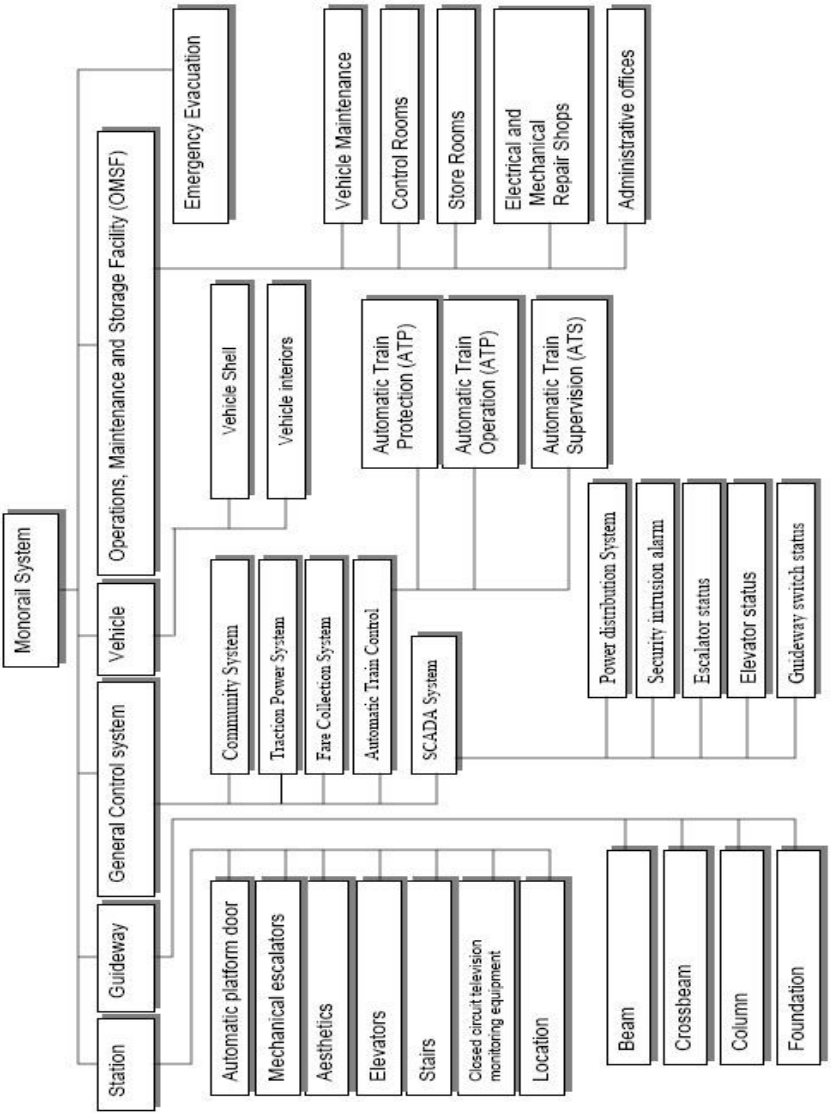
variously to describe the beam of the system, or the vehicles traveling on such a beam or track.

Power: Almost all modern monorails are powered by electric motors fed by dual third rails, contact wires or electrified channels attached to or enclosed in their guidance beams. However, diesel-powered monorail systems also exist.

Magnetic levitation: Magnetic levitation train (maglev) systems by the German Transrapid were built as straddle-type monorails, as they are highly stable and allow rapid deceleration from great speed. When in full-speed, operation maglev trains hover over the track and are thus not in physical contact with it. The maglev is the fastest train of any type, the experimental JR-Maglev having recorded a speed of 581 km/h (361 mph). The commercial Shanghai Maglev Train has run at 501 km/h (311 mph).There are also slower maglev monorails intended for urban transport, such as Japan's (Linimo (2003).

Switching: Some early monorail systems (notably the suspended monorail of Wuppertal (Germany), dating from 1901 and still in operation) have a design that makes it difficult to switch from one line to another. Some other monorail systems avoid switching as much as possible, by operating in a continuous loop or between two fixed stations, as in Seattle, Washington.

Current operating monorails are capable of more efficient switching than in the past. In the case of suspended monorails, switching may be accomplished by moving flanges inside the beam way to shift trains to one line or another.


Monorail System
Station
Guideway
General Control system
Vehicle
Operations, Maintenance and Storage Facility (OMSF)
Automatic platform door
Mechanical escalators
Aesthetics
Elevators
Stairs
Closed circuit television monitoring equipment
Location
Community System
Traction Power System
Fare Collection System
Automatic Train Control
SCADA System
Vehicle Shell
Vehicle interiors
Automatic Train Protection (ATP)
Automatic Train Operation (ATP)
Automatic Train Supervision (ATS)
Power distribution System
Security intrusion alarm
Escalator status
Elevator status
Guideway switch status
Beam
Crossbeam
Column
Foundation
Emergency Evacuation
Vehicle Maintenance
Control Rooms
Store Rooms
Electrical and Mechanical Repair Shops
Administrative offices

Straddle-beam monorails require that the beam structure itself be moved to accomplish switching, which originally was an almost prohibitively ponderous procedure. Now, however, the most common way of achieving this is to place a moving apparatus on top of a sturdy platform capable of bearing the weight of vehicles, beams and its own mechanism. Multiple-segmented beams move into place on rollers to smoothly align one beam with another to send the train in its desired direction, with the design originally developed by ALWEG capable of completing a switch in 12 seconds.[14] Some of these beam turnouts are quite elaborate, capable of switching between several beams or even simulating a railroad double-crossover.

In cases where it must be possible to move a monorail train from one beam to any of a number of other beams, as in storage or repair shops, a traveling beam not unlike a railroad transfer table may be employed. A single beam, at least long enough to carry a single monorail vehicle, is aligned at an entry beam to be mounted by the monorail cars. The entire beam then rolls with the vehicle to align with the desired storage beam.

5. Potential Benefits

Compared with the subway (heavy rail) and trolley (light rail), the monorail shows the following advantages.

1) Efficiency: Since the monorail vehicle uses a concrete or steel guidebeam for both the vehicle's running surface and structural support, less guideway maintenance is required. The monorail guide beam does not require periodic adjustment, replacement, grinding, tightening, or other maintenance. The rubber tires get little wear running on smooth guide ways.

2) Cost: While capital costs can be as much as or more than light rail, monorail can turn a profit once built. The Tokyo Monorail is operated by a private business and turns a profit each year. This is unheard of with conventional rail or bus systems. The Seattle Monorail also turns a profit each year.

3) Construction: Process of monorail construction is simple - dig a hole, drop in a pre-built support pylon, truck in the track which was manufactured offsite, lift into place! Monorail beam way can be installed far faster than the alternatives. Figure 5 shows a Las Vegas Monorail beam being put into place. From truck bed to pylons was a matter of a few minutes. The entire system took only seven months to construct. No other fixed rail can be installed as quickly and as disruption-free.

4) Aesthetics: The monorail guide way can be constructed to be an enhancement rather than a detriment to the environment. Monorail systems generally have a smaller footprint on the environment and the narrow guide beams are less obtrusive than conventional trough-type guide ways that are really more like aerial road structures. Figure 6 is the graceful arched guide way of the Walt Disney World Monorail System. The beam is only 26" wide with the small shadow.

5) Safety: Monorails run on an exclusive grade-separated guide way. So there is no possibility to collide with other vehicles. The ways by which monorails are designed also make derailments virtually impossible. This is why monorails have an excellent safety record.

6. Conclusion

Traffic Jam in Colombo is getting worst day by day. As far as there is very limited opportunities available to expand the existing road system, sooner rather the later Colombo city will be facing serious traffic problem. Not only industrial countries, developing countries that had faced increasing traffic jams such as Malaysia has introduced monorail system in Kuala Lumpur. Even though, the initial investment might be higher, in long run it will be beneficial to Sri Lanka to reduce the traffic flow in Colombo. It will not only improve the factor productivity, but also provide excellent transportation service to the citizens in Colombo.

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Portable Solar Traffic Equipment as Mobile Traffic lights

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1. Introduction

Road traffic is drastically increasing all around the world. With the increase of number of vehicles on the road, more than 1.2 million people are killed in road accidents worldwide every year. During last decade number of newly registered vehicles has increased in Sri Lanka. This rapid increase of vehicles on the road has been influenced on increase of road accidents. Friday, January 27, 2012, Sunday Leader recorded that there was nearly 30,000 road accidents in last 10 months in Sri Lanka. Even though the number of vehicles increases at rapid rate, road system and road traffic system in Sri Lanka never expand or upgrade regularly. There is no effective technologies use in traffic equipments in Sri Lanka. Especially there is no systematic contingent traffic management system in Sri Lanka. Therefore, during peak hours long vehicle jams and road accidents are very common in city limits of urban districts. However, apart from traditional traffic lights and traffic police service there is no any innovative solutions available in Sri Lanka improve the traffic management in Sri Lanka.

Traffic signs or road signs are signs erected at the side of roads to present information to road users. With the increasing traffic volume over the last decades, many countries have adopted pictorial signs or otherwise simplified and consistent their signs to facilitate international travel where language differences would create barriers,

and in general to help improve traffic safety. Such pictorial signs use symbols (often silhouettes) in place of words and are usually based on international protocols. Such signs were first industrial in Europe, and have been adopted by most countries to varying degrees.

2. Evolution of Road Traffic System Technology

The earliest road signs were milestones, charitable reserve or direction; for example, the Romans erected mineral columns throughout their empire charitable the distance to Rome. In the middle Ages, multidirectional signs at intersections became common, giving directions to cities and towns.

The development of automobiles confident more complex signage systems using more than just text based notices. One of the first modern-day road sign systems was devised by the Italian Touring Club in 1895. By 1900, a assembly of the global League of Touring Organizations in Paris was considering proposals for standardization of road signage. In 1903 the British government introduced four 'national' signs based on shape, but the basic patterns of most traffic signs were set at the 1908 International Road Congress in Rome. In 1909, nine European governments decided on the use of four pictorial symbols, representative "bump", "curve", "intersection", and "grade-level railroad crossing". The intensive work on international road signs that took place between 1926 and 1949 eventually led to the growth of the European road sign system. Both Britain and the United States developed their own road signage systems, both of which were adopted or customized by many other nations in their respective spheres of influence. The UK adopted a version of the European road signs in 1964 and, over past decades, North American signage began by some symbols and graphics assorted in with English.

Over the years, change was slow. Pre-industrial signs were stone or wood, but with the development of Darby's method of smelting iron with coke, painted cast iron became preferential in the late eighteenth and nineteenth centuries. Cast iron sustained to be used until the mid twentieth century, but it was gradually displaced by aluminum or other materials and processes, such as vitreous enameled and/or pushed malleable iron, or (later) steel. Since 1945 most signs have been made from sheet aluminum with paste plastic coatings, these are normally retro reflective for nighttime and low-light visibility. Before the development of reflective plastics, reflectivity was provided by glass reflectors set into the lettering and symbols.

New generations of traffic signs based on electronic displays can also change their text (or, in some countries, symbols) to provide for "intelligent control" linked to automated traffic sensors or remote manual input. In over 20 countries, real-time Traffic Message Channel incident warnings are conveyed directly to vehicle navigation systems using inaudible signals carried via FM radio, 3G cellular data and satellite broadcasts. Finally, cars can pay tolls and trucks pass safety screening checks using video number plate scanning, or RFID transponders in windshields linked to antennae over the road, in support on-board signaling, toll collection and travel time monitoring.

Yet another "medium" for transferring information normally linked with able to be seen signs is RIAS (Remote Infrared Audible Signage), e.g., "talking signs" for print-handicapped (including blind/low-vision/illiterate) people. These are infra-red transmitters helping the same purpose as the usual graphic signs when conventional by a suitable device such as a hand-held handset or one built into a cell phone.

Bartco is the leading Australian producer of portable solar traffic equipment, supplying road work projects, hire companies, construction firms and government agencies around Australia, Europe, North and South America. It has introduced Advanced Directional Signs that gives mobility and diversity to the traditional fixed traffic signals. Advance directional signs come into view at a certain distance from the interchange, giving information for each direction. Traditional traffic signals do not provide information for the road ahead (so-called "pull-through" signs), and can only be used to give directions. However, advance directional signs let drivers to take precautions for the exit (e.g., switch lanes, double check whether this is the correct exit, slow down).

3. How the Technology Works

i. Portable Solar Traffic Signals

Bartco Portable Solar Traffic Signal is powerful but light weight solar powered dual preview system, quick and easy to setup and operate. They are intended for high-visibility signalling in applications ranging from work zones and viaduct repair to special events and emergency backup.

Whatever your application, you can be certain that our traffic equipment will have your needs enclosed. Bartco Portable Solar Traffic Signals are the most advanced and reliable portable traffic signal system to the industry today.

These Traffic Signals are Solar powered / environmentally friendly and it work on Radio link communication with LCD display and use only low powered. It also has high brightness, LED lanterns and Default System reverts to flashing yellow if there is a break in communication. It has a remote programming control and Microwave detection. It is easy to setup (one person can setup it in less than 10 minutes)

ii. Portable Colour VMS

Bartco 5 Colour Variable Message Sign Boards are intended and manufactured to meet Australian and International Standards. Their entire range of VMS are solar powered and use the newest in LED technology to generate text, graphics and animations.

They are ideal for work zones, construction / mining sites, school & pedestrian zones and anywhere where speed enforcement is necessary as well as for events & advertising promotion such as generous, festivals and car yard.

Bartco 5 Colour VMS is available in 3 sizes:

It has highest quality 5 Colour LED Full Matrix (Red, Green, White, Blue and Amber) , Full graphics and animations, Plug & Play controller and LED models, Auto lighting control, Hydraulic Lift System (C Size), Auto-retract jockey wheel, Wheel locks, Aluminium checker plate, LED tail lights, Vandal security bolts (solar / screen), Global Positioning System: Satellite Tracking & Tamper Alarm, Easy Remote Programming from any internet enabled PC/Laptop/Tablet/Mobile and it can be adapted to multi-languages.

4. Conclusion

Most of the roads in urban areas in Sri Lanka are having fixed traffic signal posts that give only the directional instructions to the drivers. In some roads there are too many traffic lights that has made the driving more difficult. However, there is no formal contingency traffic

signal system in Sri Lanka. When the temporary road constructions are going on or vehicles met with accidents there is no systematic way to guide other drivers to avoid the traffic. The portable solar traffic equipment is giving the true mobility to the traffic signals that can be move where ever required it service. As far as portable solar traffic equipment generates its own power requirements through solar energy it will be cost effective for the road authorities and for the country too. Sri Lanka is tropical country with blazing sunshine in most of the time in the year. Therefore portable solar traffic equipment is best suited required technology in Sri Lanka.

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An E-Card System for Sri Lankan Public Transportation

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1. Introduction

In Sri Lankan context, most of the public sector entities and services have been not positively contributed to the socio-economic development of the country. Among other reasons, usage of legacy systems and methods has been one of the factors that contributed to low efficiency. Sri Lankan transport industry is also operating under that category. Both private and public sector transport mediums provide minimum facilities, comfort, safety and convenience to the passengers. Apart from the physical conditions and the bus ticket issuing process in Sri Lankan public buses have contributed to number of unfortunate incidences on the roads.

When evaluating Sri Lankan public transport industry, it is still using traditional methods for ticketing process. There should be a separate person for issuing tickets and conduct the passengers. In Sri Lanka there are no unique tickets which use to issue for the passengers. Some government transport use written tickets, and even most of the private transport are still using a printed ticket without using ticketing machines. When considering the modern world, it is very much out dated method and a way of wasting human resources. Mainly in Sri Lanka, human resources are using to issue tickets in public transportation system. That's more time consuming and it can

create more human errors. In Sri Lanka, bus conductors issue tickets for the distance that passenger expects to travel, but that is an old system and it can be improved. Therefore there is a need of restructuring the ticket issuing system in Sri Lankan transportation industry.

Even though, there was a discussion for introducing prepaid card system to Sri Lankan private buses, it is not yet properly executed. However, countries like Singapore and Malaysia have developed more efficient electronic card system that can give benefits for both passengers and the bus companies. As far as there is no human involvement in issuing tickets, it would ensure that passengers are not under pay or over pay during their journey. It would positively contribute to the transport industry to get actual profit they can earn from their route.

2. History of the Technology

Singapore is the emerging countries in the Asia region who is one of

the pioneering user of the electronic cards system call EZ- Link managed by EZ-Link Private Limited. EZ-Link was formed by the Land Transport Authority (LTA) on January 8 2002, to manage Singapore's single largest contactless Stored Value Smart Card System that has been mainly used for payments on public buses and trains since April 2002. EZ-Link is a wholly owned subsidiary of LTA and is regulated by the Monetary Authority of Singapore and the Public Transport Council. Specifically, EZ-Link is responsible for the sale, distribution and management of EZ-link cards as well as to process the clearing and settlement of all EZ-link card transactions

generated in both the transit and non-transit (retail/merchant) sectors. In total, EZ-Link had issued over 10 million EZ-link cards from 2002 to 2008 and achieved the highest wallet amongst the contactless pre-paid card market in Singapore.

3. How the Technology works

The EZ-Link card operates on a radio frequency (RF) interface of 13.56 MHz at 212 Kbit/s, with the possible for communication speeds in excess of 847 Kbit/s. It employs the Manchester bit coding scheme for noise tolerance against distance fluctuation between the card and the contactless reader, and implements the Triple DES algorithm for security.

When considering the process of the EZ-link this card consists with a small microchip which could be read by using a separate EZ-Link card reader, this equipment located at the entrance of bus. There are typically two card readers on both entrance and exits of every public transport media. In Singapore, when passenger entering to public transport media at front door, he can touch his card to the card reader and that reader identify the passenger's entrance. If card does not have sufficient amount to fulfill the journey the machine will automatically reject the card. When that passenger getting down from that bus, he should touch that card to back door card reader to charge relevant amount for his journey. Chargers are calculated according to the distance he/she traveled.

When the passenger does not have the EZ-link card or required amount for the journey there is a card issuing and reloading machines located near to the driving seat. There are two buttons; one to purchase card and one to reload the card. Passenger can press required button first and then insert the currency note in to the machine. If the passenger requested to buy a card, new card will be issued by the machine. If the passenger requests to reload the card, he/she need to touch the card on the sensor that locate top of the machine and wait for approval. Unless there is technical fault in the machine, passengers can independently buy and reload their EZ-Link cards.

4. **Potential Benefits**

Since this is a successful story in a country like Singapore it is also applicable to the Sri Lanka. First of all we need to understand the factors that make this system a success in Singapore. They are having some favorable rules & regulations to implement this system and they are having a better attitude on transportation since it could make a good contribution for development & tourism.

When using the electronic cards both human resources and paper wastage can be eliminated. On the other hand some people in Sri Lanka try to go in public transportation without taking tickets or

paying for a less distance than he travelled, with using this type of a technology, we can totally eliminate such kind of frauds.

This electronic card system has more transparency than the local ticketing procedures, because passengers have the advantage to pay only for the distance, they have spent through public transportation. And it only reduces the exact amount from their pre-paid balance with according to the standard chargers.

Passengers have the opportunity to top-up their cards by using several ways such as; they can top-up cards through internet in any location by easily logging in to their internet accounts, regulatory bodies can install machines to top-up their cards. These machines can be located near the central Bus stands or other important public places so it provide the easy access and improve usage of these cards.

5. Conclusion

Singapore implemented this system initially as a pilot testing of the cards, to 100,000 volunteers on 26 February 2000. This method also can apply for the Sri Lankan market with the same way. There is a new intention to travel by using the Highway in Sri Lanka. We can conduct an initial pilot run to evaluate the successfulness in this method, for the Bus Transport in Southern Highway with a parallel run of old ticketing system. There is an added advantage for us because Highways are cost effective & new idea for Sri Lankan, so with such situation it may reduce the resistance to change even & also we are having same kinds of advantages as we identified in the Singapore market. Such as Sri Lankan government is also Sponsoring for transportation development to have a recognized transport system in Sri Lanka with purpose of development and tourist attraction.

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Solar Power for Public Transportation in Sri Lanka

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1. Introduction

Transportation is a very essential thing for every person who lives in this modern society. It is playing a major role in the development of a country as well. a person wants go somewhere, he or she should use a transportation method which can fulfill person's requirement. In third world countries like Sri Lanka, India, Bangladesh etc. most of the people use public transportation system to fulfill their transportation requirement. If we consider about current situation in Sri Lanka, majority of people use public transport systems like railway (trains) & highway (buses). The railway moves 300,000 passengers daily on 324 trains between 320 stations across the country. There are more than 13,000 private & government buses in Sri Lanka. More than 05 million passengers are travelled daily by buses.

Vehicles are mainly running using fuel like diesel, petrol & gas power, Because of that we spend a lot on transportation and it causes air pollution as well. Nowadays price of fuel is increasing. Sri Lankan fuel price & transportation fees are also changing according to the world fuel price, as a result, bus fares and the price of the other commodities are also increasing. Therefore, world fuel price plays a major role which affects for everything and everyone. If we consider about this problem regarding only in Sri Lankan context, gradual increment of bus fare is becoming a burning problem.

Is there any solution for this? Yes.

We can use solar powered buses as a solution for this fuel problem because it can be easily implemented in Sri Lanka. It'll be a subsidiary for fuel and also as we know Sri Lanka is a country which is located nearby equator. Sri Lanka has the good consistent sunshine annually except monsoon season. Therefore solar power buses are applicable for Sri Lanka without major problem. As a result public transportation services can avoid so many problems including fuel problem. If we apply these solar power buses for Sri Lanka we can get number of advantages from it.

2. Situation in Sri Lanka

Public Transportation in Sri Lanka is based mainly on the road network which is centered on Sri Lanka's capital, Colombo. Good network of metaled roads exists in Sri Lanka linking all major towns and tourist destinations. Road network is the backbone of Sri Lanka. Over 70% of the nation's traffic traverses the country using the good network of metaled roads that exist here. The average speed limit of traffic within city limits is 50 – 60 km per hour, while maximum speed is up to 80 km per hour on non-city limits

If we consider about public highway transportation in Sri Lanka, there are only two major parties.

1. Sri Lanka Transport Board.
2. Sri Lankan Private Bus Owners' organization.

A nationwide network of buses operates in Sri Lanka comprising 'public' worker owned buses referred to as CTB (Ceylon Transport Board) buses, which are wholly government owned buses. A network of privately owned buses complements this network of government - run buses. Express bus services offer a more comfortable and faster

means of transportation. Buses Express bus services run only to all major towns.

These two major parties have more than 13,000 buses and they are supplying a valuable service for our country for long years. But they are not able to find solution for the passengers. Sri Lankan passengers found lot of problems with public transportation.

- Uncomfortable traveling models
- Uncomfortable and crowd.
- Less availability of buses.
- Unaffordable bus fare.
- Time waste in traffic jams.
- Air pollution with fuel burn.

The most gravity issues in here are cost of travelling and air pollution.

i. Cost of travelling

Bus service and bus fare depend on fuel price. Every bus runs using only diesel, that means if there is a fuel scarcity, buses can't run. If fuel price is increased, bus fare also increases automatically. Bus fare was increased more than two times during past decade because of fuel price. In last year, minimum bus fare was Rs. 6.00 and after few months it became Rs. 7.00 moreover the new minimum bus fare is Rs. 9.00 just because fuel price. It seems price of fuel is controlled our lives directly.

If we consider about the conditions of buses in Sri Lanka, there aren't a good quality and good condition to travel for the passengers. But

passengers have to pay money more than the facilities they received and road condition is not in satisfactory level.

ii. Air pollution

Ministry of environment says almost 60 per cent of the air pollution in Sri Lanka is from the emissions by motor vehicles.

There are 714,058 motor vehicles in Sri Lanka which are older than 20 years. Ministry says each vehicle emits 14,730 million carbon particles per square meter to the environment each year. It can be reduced to 9,000-4,000 particles per square meter by using a proper technology.

Recently Government decided to reduce the motor vehicle tax and as a result of that more vehicles will come to Sri Lanka. Sri Lanka imports second hand and reconditioned vehicles from developed countries. Those vehicles emit excessive amounts of harmful chemicals to the environment.

As US Aid program declared "By 2001, the air quality in Sri Lanka's major cities was deteriorating rapidly - largely due to pollution from vehicles using leaded gasoline. Even at low levels, lead exposure can affect brain development, reduce learning ability and cause behavioral disorders, especially in children. However, lead poisoning is also entirely preventable, and eliminating the use of leaded gasoline is a critical first step to reducing exposure on a wide scale. In June 2002, the Sri Lankan government launched the 100 Days Program, halting sales of leaded fuel countrywide. But it needed to provide evidence to policymakers and the public that the program would be effective and beneficial to keep up the momentum for additional measures to improve air quality".

When considering above facts we should find a solution for the above problem. There is an applicable solution for this situation. We can apply solar powered buses instead of fuel depended buses. It would helps to reduce the cost and also air pollution.

3. History of the Solar Powered Buses

During the 1990s, regulations requiring an approach to "zero emissions" from vehicles increased interest in new battery technology. Battery systems that offer higher energy capacity has became the subject of joint research by federal and auto industry scientists in industrial countries.

Solar cars were first automobile built by universities and manufacturers. However, those innovative cars were not taken to the open market, because of the sun energy collector areas proved to be too large for consumer cars at the beginning of the technology. However, Research and Development continues on solar cell design for automobiles and car power supply requirements such as heater or air-conditioning fans.

Owing to the inherent limitation of motor cars to have larger area that needed to fix solar panels, researchers have focused on the vehicles with large surface areas to fix solar panels. Public transportation buses were identified as one of the best suited surface provider for big solar panels.

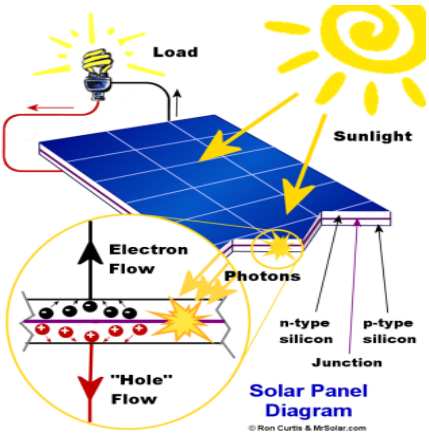
SunPods Inc., a California-based manufacturer of modular, fully integrated and tested solar power generation systems, and Bauer Intelligent Transportation, a leading provider of chauffeured green transportation, recently teamed up to create what they say is the "first solar power-assist system for buses." The system was developed in less than six weeks.

Meanwhile in Japan, Sanyo Electric has teamed up with public transport operator, Ryobi to set up solar cells on the roof of a city bus, dubbed Solarve, in Japan. Ryobi has developed this green innovative bus to observe its 100 year anniversary. A total of 798 watts from Sanyo's solar cells will power the interior lights and when sun shies away, the storage batteries of the bus will take over.

4. How Active Solar Energy Works in Buses?

Active solar energy is more technology oriented. These methods use photovoltaic cells that directly convert sunlight to electricity, which can then be used easily for almost any purpose just like solar buses. Solar vehicles exploit energy from the sun, converting it into electricity. That electricity then charges the battery that runs the motor. Instead of using a battery, some solar vehicles direct the power straight to an electric motor.

The main ingredient of solar energy creation is the **photovoltaic cells (PVC)**. PVCs are the components in solar paneling that convert the sun's energy to electricity. They are made up of **semiconductors**, usually made of silicon, that absorb the light. The sunlight's energy then frees electrons in the semiconductors, creating a flow of electrons. That flow generates the electricity that powers the battery or the specialized motor in solar vehicles.



Then there's the problem of how to get around at night or on rainy days when the sun is nowhere to be seen. Here's where a battery or small gas engine would come in. Most viable solar car projects rely on additional power sources to ensure that the car gets going any time.

The SunPods, Sun Bus Power System was developed in less than six weeks in collaboration with Bauer Intelligent Transportation, a leading provider of chauffeured green transportation, to enable the company's fleet to meet the strict anti-pollution standards set by the State of California.

In an effort to meet air pollution standards, since 2008 California state law has prohibited diesel vehicles from idling for more than five minutes. More than 25 states across the United States now have anti-idling laws. SunPods' modular solar power assist system consists of four thin film solar panels that run the length of the bus and charge an on-board battery bank. When the bus engine is off, the batteries power the air-conditioning and wireless connectivity equipment,

enabling transportation companies to effectively meet anti-idling standards without compromising passenger comfort.

5. Conclusion

Countries in Asian sub-continent get more sun raise than in the USA and other western countries. Many of the cities in Sri Lanka gets bright sun shine in daytime that averagely have 25-35 Celsius temperature. Meanwhile, all the automotive energy sources are imported to Sri Lanka and it is the highest percentage expenses on an imported product. Therefore, Sri Lankan transportation industry has momentous opportunity and requirements to move to solar energy and introduce solar powered buses to get the advantages of potential benefits of solar energy in transport industry. As far as scarcity of crude oil, fuel prices are continually increasing. Therefore, unless policy makers tries to introduce alternative energy sources such as solar power, sooner rather later, transportation cost will be a significant issue in Sri Lanka

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New Business Models and Products

"…Many companies have already been lured by the promise of profits from selling low-end products and services in high volume to the very poor in emerging markets. Also high-end products and services are widely available in these markets for the very few who can afford them: You can buy a Mercedes or a washing machine, or stay at a nice hotel, almost anywhere in the world. Our experience suggests a far more promising place to begin: between these two extremes, in the vast middle market. Consumers there are defined not so much by any particular income band as by a common circumstance: Their needs are being met very poorly by existing low-end solutions, because they cannot afford even the cheapest of the high-end alternatives. Companies that devise new business models and offerings to better meet those consumers' needs affordably will discover enormous opportunities for growth…."

Matthew J. Eyring, Mark W. Johnson, and Hari Nair
Harward Business Review
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Silent Salesman: Vending Machine Technology adaptation in Sri Lanka

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1. Introduction

A Vending Machine is a coin or note operated machine selling products ranging from fast moving consumer goods up to selected electronic items. Vending machine has been considered as the best automated retail solution that with one swipe, eliminating the wonder through retail shops and super markets, thus ensures the round the clock convenience and exclusivity and impulse purchases for all customers. At present there are thousands of vending machines operated around the world providing convenient and prompt purchases of simple to most sophisticated array of products. This includes soft drinks, chocolates and confectionary, news paper and caffeine beverages, cigarettes and short pastries, soups and cosmetics and list is endless.

Mostly these machines could be found in factory premises, offices, retail shops, fuel pumping sheds, hotels and restaurants offering customers the advantage of quick 24 hour service and the most striking feature is these machines could be operated with no human interference.

In practice even in Sri Lanka, we have seen many caffeine and tea dispensers, but these machines do not fall into the category of

vending machines as they are not responsive towards the money/ card / coin inserts and vendor handles the machine all by himself.

The actual vending machines that are been discussed here is responsive to coin, money note or a credit card and the goods are dispensed in the meantime without a sales person. Most importantly vending machines enable round the clock sales of products, which aids in achieving the most lucrative sales volume with minimal operating cost. In improving the productivity and customer relations, a lot of new innovations are being incorporated in to vending machines

2. History and the Evolution of Vending Machines.

The very first point of reference to a vending machine could be found in the works of Great Alexandra, who was claimed to be an engineer and a mathematician during the first century, he created a machine which accepts a coin to dispense Holy Water. When coin was entered into the machine it will land on a pan attached to the lever, and it opened a valve letting the water to flow out. Pan will tilt as per the weight of the coin and at one point counter weight will snap the lever up and adjust the valve back to normal.

In industrial Sense , the first coin operated was introduced in UK – London in early 1880 to dispense post cards , followed by that first vending machine in USA was built in New York City train platform dispensing gum and later on more sophisticated add on 's were introduced. Vending machine idea was considered as a trade simulator and around the clock sales rep.

In the beginning of the times, Vending machines producers were supplying soft drinks, short snacks and caffeine through these machines. This spreads a real awareness of drinks vending significantly. One of the biggest success areas at the time was in the

manufacture of disposable cups. Even today in most western and Europe countries coffee vending machine is a widespread sight in the majority locations where there are a great number of persons. Whether you are in an airport, a hospital or an office building, the probabilities of being able to grab a cup of coffee, a snack or soft drinks from a vending machine is extremely good.

In its earlier days buyers were hesitant to grab food products from vending machines, as they suppose these machines do not necessarily offer healthy or fresh things. Consumers had shown a desire to read nutritional value labels before to purchase. That is precisely why they never trusted the freshness of vending machine items. With evolving time simple vending machines turns into fresh vending machines to offer the fresh and healthy food stuff for consumers. Fresh Vending meets the consumer demand for healthy and fresh easy access food options. This is the reason for the presence of these fresh healthy vending at most of the places such as gyms, schools, shopping places, colleges and offices.

With the recent explosion of vending services, along with the upcoming arrival of near field communication, which has close linkages with phones to bank accounts much more swiftly than credit card readers, it's clear that anything that can be sold will eventually be sold by a vending machine. Especially when most of the vending machines are light weighted and portable the task is simpler.

3. Vending Machine Mechanism

Vendor machines are operated on the basis of a collaborative set of new technologies.

i. Wireless Communication

With the use of wireless communication method, vendor receives up to the minute overview on inventory and sales trends. When inventory is running low below the buffer stock, ware house and closest outlet / office is updated and within an average response time period of 2 to 4 hours inventory is restocked. Minute to minute sales trend analysis will enable the sales force to make prior predictions on day end sales units there by the production will also be adopted to suit the excess demand where necessary. It is noticeable that wireless communication renders 40% less carbon emissions than the usual PC usage for sales and it helps in reducing the overheads and reduce the power consumption.

ii. Use of Debit Cards / Credit Cards for Payments

The main criticism that vendor machines in west faced was that the coin / money note that is inserted could be a counterfeited one, but the new technology has enabled to use the credit card or may be a debit card , where customers find it difficult to cheat .Certain vending machines provide the facility on stored value system and point of sale systems depending on customers' requirement.

iii. Immediate and Exclusive Local Reports

Vending machines provide immediate reports on latest sale trends, inventory level and required buffer stock. In that sense a perfect stock control could be carried out. Especially if vending machines are used in a chain of restaurant, the technology will link each vendor for different supplies (Eg: reports on cola / pizza / deserts etc).

iv. GPS : Global Positioning System

All distribution vehicles are equipped with GPS which enable a smooth tracking and all vending machines are connected with the main office on sales. All employees carry a wireless phones and

dispatched calls where the team communication is enhanced. Use of mobile devices and emails also enhances a smooth supply of end products.

4. Vending Machine Technology Adaptation in Sri Lanka

When discussing vending machine operations in Sri Lanka , it has not been installed and operated properly in local context at all, however we have already experienced on Nescafe/ Tea / Ice – cream , but their functionality has never been to any closer as for a vending machine.

Considering the local market, these vending machines could be extended to those of detergent / soap / pharmaceuticals for non prescribed light medicine etc. Sri Lanka's market is far smaller than a state population when comparing with US, thus practicality of implementing this technology should be much easier.

Following provide a justice in reasoning the applicability of vending machine technology in Sri Lanka

i. Unbeatable product visibility:

Vending Machines not only display the products but also sell them, this is more appropriate when there are many brands to choose in between , as through vending machines encourage brand exclusivity .

ii. Impulse Purchases

Vending machines enables the products to be visible to the customer enabling common marketing principle ; the more you see more you buy , to be practiced, and this generates impulse purchase

iii. Wider Distribution

Vending machines are secured and a perfect way to store goods with a towering hygiene where the customer is mutually is guaranteed with a clean and uncontaminated product. This could typically be used to promote products that influence consumers buying behavior and choices with various methods , thus automated vending machines could be "the ideal" way in testing the change in customer response.

iv. Enhanced Brand Image

Vending machine is undoubtedly a *new generation sophisticated* method of merchandising and should be most applicable to fast moving consumer goods , where it positions the company and its brand/s as sophisticated and forward minding.

v. Silent Salesmen

Vending machines work quietly and generate sales around the clock for 365 days a year. Especially Sri Lanka for being a country which has declared holidays excessively than the west, vending machines provide the perfect solution for sales generation keeping the sales forces away. This will further be accommodated with arguments as, labor strikes and extensive leave problems. Even though the employees go on strike, sales will not be dropped until some later time.

vi. Avoid of Adulteration

Vending machines provide a solid solution for adulteration of products from the original content, especially in terms of pharmaceuticals and detergents, chocolates and confectionary .This situation is most probable which contaminate the brand image and eventually leads to a heavy loss in revenue . Also it is important to notice that there can be a lot of first time customers, where the

companies need to ensure to last the first impression on them, where the adulteration and duplicates can make it the other way around.

vii. Deeper Market Penetration

Vending machine allows firms to tap on newer markets making the own share grow further yet keeping one step always closer to the customer. These machines subtly perform point of sale advertising and promotion of the product, lessening the burden on overheads and post distribution promotions. And further it offer the customer with redeemable coupon , sweep takes , price off and free offers .

5. Sri Lanka's Locally Invented Vending Machine

For the first time in the world, a Sri Lankan entrepreneur has designed an instant hot and cold tea portable vending machine capable of pouring hot and cold tea via SMS. This model will be exported to Dubai, Korea, Japan, India and the Maldives and other neighboring countries by the mid of 2012.

The mentor behind the project, Ni-Cey International Chairman G L Thilakaratne said they will be installing these machines in public places in Colombo soon."Initially a person with a Mobitel connection could send a SMS to a pre given number and the machine will intercept this message and pour out the drink," he said. The coin option too would be available.

He said that this process involves six messages going from one point to another but for the customer the process takes less than 20 seconds."This is actually 2020 technology being given today and more options would be added next year to the machine," he said. The machine branded as 'TeLak' has local technology and parts imported from Korea and Japan.

The next stage of the machine would see 'hot chocolate' being introduced and 'cans' too will be introduced later. Sri Lanka being the manufacturer of world's finest tea, more coffee machines was available and this prompted him to manufacture an instant tea machine to the local market. "TeLak Tea Maker is a new concept to the tea drinking industry.

6. Essentials for a Successful Vending Machine Implementation

* Identifying the vending need
* Choosing reliable equipment suppliers
* Ensuring strong service support
* Getting the strategic location of machine
* Getting the right product mix
* Ensuring strategic placement of brands in the machine
* Ensuring an efficient vending operator is required

Vending machines are relatively new but still it has novelty value. As is typical in all countries, convenience gradually becomes a habit. There are numerous potential growths waiting for marketers and manufacturers to install the machines at a location. For many marketers promoting products through vending machines the aim is to reach the final stage as soon as possible.

In closing note , Sri Lanka is being moving into a rapid boost in tourism industry and these vending machines can actually be useful than any time in history , foreigners are those who have already got used to this technology and being a destination of their attraction can actually provide justice . Even today the young generation is more tech – savvy and this technology, if used for acceptable products will be a boon in both commercially and industrially.

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Technology for Hotel Industry: W.O.S. Restaurants

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1. Introduction

Technology has been a key driver of growth for the hospitality sector in the last decade all over the world. New technologies for jobs like real-time inventory access, seamless exchange of operational information and collection of key performance data, have transformed the hotel and restaurant business. And the biggest positive from this process has been the enhanced customer experience, leading to higher degree of loyalty. Thus, technology has increased profits for restaurants and hotels, and also helped in reining in costs on a long-term basis by reducing manpower and improving the quality of service. No restaurant or hotel owner in today's environment can afford to ignore technology. Almost every stakeholder we spoke to, talked about the crucial help technology has rendered in their growth and competitiveness. The benefits far outweigh the cost of technology.

Sri Lanka tourists arrivals have surged to a record number of 654,476 arrivals in 2010 surpassing the previous all time with high hits due to the post conflict peaceful environment. The foreign exchange has increased by 62% from Rs: 40,133 million in 2009 to rise 65,018 million in 2010.

2. Situation in Sri Lanka

After the end of the war, Sri Lankan hospitality sector has grown up at rapid phase with a sharp increase in tourist arrivals and tourist earnings in the last 2 years. Graph is an extraction of *Central Bank Recent Economic Development Report 2011* about the tourist arrivals and earnings in Sri Lanka for the past few years.

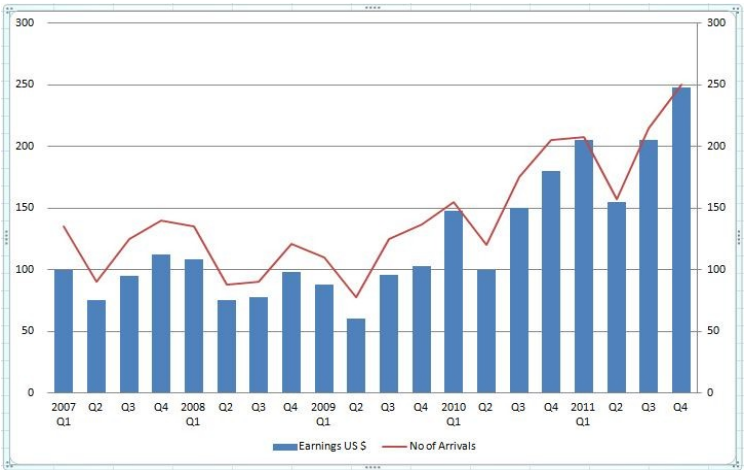

Figure 01: Tourist arrivals and earnings in Sri Lanka
Source:*http://www.cbsl.gov.lk/pics_n_docs/10_pub/_docs/efr/recent_economic_development/RED2011/Red2011e/7_Chapter_05e.pdf*

According to the above statistics it is crystal clear that tourist arrivals were increasing over the time and there is higher potential of benefit over the hospitality industry. Locals also now make their leisure time to spend on hotels, restaurants. The hotel and restaurant industry in Sri Lanka contributes 0.5% to the GDP in 2010(increase by 0.1% of GDP than 2009). As such, in order to gain advantage, hospitality industry is now in a intense competition, the Sri Lankan hospitality industry has constant opportunity to highlight their growth and smart

implementation of technology because in a highly dynamic environment which constantly evolves to guest requirements.

3. Evolution of Technology

Traditional restaurants are preceding their operation through the manual system where they provide food & beverage on demand of the customer rather than thinking about their satisfaction, High wastage, less efficiency and the longer customer waiting time are few issues that the traditional restaurants face. And there is less privilege for customer to utilize the fresh meals. Simply in traditional restaurants and cafes waiters take handwritten orders and inform the service locations (e.g. kitchen, cashier, and bar) with slips of paper. As a result, the waiting time is longer; some orders may be missed out; control over charges is not efficient, and control over the stock and calculation of the sales per species is problematic. Additionally, in the lack of an automatic way to control, a person, the "check-man", is usually in charge to control the waiting time and whether the orders have been served and equivalent to the customers.

Traditionally customer who comes to the restaurant has to seat in a place and wait until a waiter come with a menu. Then customer has to select the meals by going through the menu while the waiter with a pen and a paper list down those preferences. After that waiter will run into the kitchen to place orders and wait or serve to another customer until the kitchen staff prepares the order and ask the waiter to serve it to the customer. Then after serving the meals to the customer, waiter will do another job until customer asked to bring the bill. Finally waiter has to go to the cashier and present the list of items that the specific customer ordered and take the bill from the cashier and give it to the customer and take the cash/credit card and then

again walk to the cashier to settle the bill and bring the balance/credit card with bill to the customer.

Most of the Sri Lankan restaurants are still operating with this traditional way of doing restaurant business and there is no such technology incorporated to streamline their business where other countries keep incorporating new business technologies into their restaurant businesses in order to gain competitive advantage with knowing the fact that hospitality industry is mainly based on customer satisfaction.

In this traditional way of doing restaurant operations customers have to wait a longer time until waiter gets the order, serve the meals, and bring the bill to pay while dissatisfaction level of customers increase and most customers nowadays don't want to spend lot of time inside the restaurants. This conventional way negatively affected the business in many ways where it consumes lot of time as well as the cost. Waiters have to handle heavy workload such as taking orders, serving meals, taking payment and rearranging tables and the kitchen staff always getting confused with the conflicting orders placed by the waiters because sometimes waiters will place orders which cannot be prepared due to the unavailability of certain food items and also wrong order where kitchen staff need to once again contact with the waiter and verify it. Also the kitchen staff has a limited accessibility to the consumer to know the customer's preferred way of preparing food. Further lesser availability of relevant information about meals such as particular quantity of the specific meal availability, details about the ingredients used and nutrition makes the customers uncomfortable and dissatisfied because now the trend is people are more health conscious and they would prefer to know what is inside the meal. Mostly cashier has to wait or depend on waiter to process bill making the billing process unreliable. Also owner/Cashier has to

enter orders sequentially in manual where the end of the day to see what happens which will contribute to lesser accountability.

Identifying the stock needs and stock valuation is unrealistic due to no indication of food items finishing and it might require immediate purchases and also to wait until the end of day to see what the food items required are. All these surely lead to higher wastage/cost and time consumption due to a lack of a proper integrated system.

According to the recent findings there is a huge need of Enterprise Recourse Planning system (ERP) & Total technological solutions for the hospitality & the leisure industry in Sri Lanka. Through this article our concern is to illustrate one of state of the art business technologies known as "Wireless Restaurants" that now being rapidly spreading over the hotels, especially restaurant business all over the world.

4. How the Technology Works

W.O.S is one of the newest technologies which now being practicing successfully all over the world in order to eliminate most of the previously discussed limitations in traditional restaurant process. Through under this system customers can enter the orders in the wireless devices such as I-Pads/ Personal Digital Assistants (PDAs), which automatically inform the central server in the restaurant and it will distribute the information into waiter's I-Pads/PDA and also the order is visualize in the screens that are at the kitchen. When the order is ready to be served by the kitchen, waiter is informed through I-Pads/PDA which waiter has and they go to the service locations and serve the orders to their customers.

The customers can also add several details regarding the orders (e.g. well cooked) either by pressing the appropriate choice or writing on

the touch screen of their terminals. Payments can be done through either the device if it is an E-payment or ask the waiter to come and collect the cash.

Even though this is called as an ordering system, this system integrate the whole restaurant process such as order taking, billing, inventory management, etc into a single mechanism by eliminating non value adding activities of the traditional process. This ordering system saves time of waiters, decreases the waiting time for the clients, reduces the possibility of mistakes and omissions, allows for the analytical calculation of the sales in terms of quantity and species, and facilitates the management of the restaurant operations. The new wireless ordering technology featured with wireless connections between devices at all through the whole process, from the beginning of taking order until the end of taking reports because all of the devices are connected through Wi-Fi enabled system. Also each and every device including the main server consists with customized ordering software built based on individual restaurant requirement by a reputed software company. Mainly it allows customers to customize their meals suit to their preferences and if some meal is not available the system will indicate that immediately to the server as well as customer's I-Pads/PDAs so there won't be any kind of customer dissatisfaction.

This wireless system makes it easy to real time inventory valuation, real time table status &table management where there is no need of manual entries and makes it easier to calculate meal costs and attribute to pricing process with addition of their profit margin. Remote kitchen order viewing through large screens makes the kitchen staff works easier. End of the day each and every company wanted to measure their performances so reports can be generated through the system anytime needed such as detailed sales history and

detailed profitability reports etc. Making this system user friendly and easy to use avoid customers resistance or afraid to use the devices. Having the capability of memorizing the customer preferences increases the customer satisfaction and they will probably visit the same restaurant next time. Membership can be obtained if it is a regular customer and able to get discounts. It has the functionality of splitting/merging the bill feature among the group of customers. Multiple payments facilities such as Credit cards and E-payments are enabled through this system. Other than those main features, there are many extra features such as browsing internet, reading daily news papers, exchanging E-mails, reservations, street maps, and printing documents and playing games until meals are served. Figure 01 illustrates the simple structure of W.O.S.

Figure 01: Structure of W.O.S

According to this simple structure we can see how the orders are placed through wireless handy terminals and the information distributed and shared among the waiters, kitchen, cashier, and the

customer through the wireless network provided with wireless routers and hubs.

When it comes to implementing such a system most businessmen might get confused with the issue of security thus this system is protected with highly sophisticated multilevel password features and E-payment security where it is hardly difficult to hack or send virus by an external party. Customers are not allowed to alter the content or information in the device. System requirements are mainly server computer, PDA`s/i-Pads, wireless router, Printers and applications such as customized ordering software, database software, firewall protection, virus guards, E-payments gates, etc.

5. Conclusion

Establishing proper system might not cost that much to the restaurant thus the benefits will overrun the costs immediately. Periodic maintenance and reviews benefits to the organizations would be higher through increase in customer visits and reduction of non value adding cost such as excess staffing and inventory control etc. Customers' less preference to select through the devices as a result of their individual perceptions or due to illiteracy can evenly be mitigated by enabling various languages and by providing instructions through a simple manual on the table itself.

Employing wireless ordering system in a restaurant will also allow them to differentiate their services from competitors' services. That may also give them a chance to charge premium price for the unique experience. Mean while this will also benefit in the national level too. Introduction of technology will spread and the entire restaurant industry will benefit.

Today in post war era, tourism and leisure are important areas where Sri Lanka is focusing on developing the economy. Sri Lanka expects more and more tourists in the coming years. Using above mentioned wireless ordering system will certainly provide customers with a unique experience and in turn it will help to provide a satisfactory customer service to the guest. Mean while WOS will also play an important role in increasing efficiency of the restaurant processes. As a result of increased efficiency, restaurants will reduce their overhead costs and will be able to provide better competitive price to their customers. Using WOS will improve the customer experience and build a reputation among guests. This will be of paramount importance in attracting more business to Sri Lankan tourism industry.

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SMART Phones for Insurance Industry

H.R Sahabandu.
A.G.S.A Kumari.
L.D.D Suranga

1. Introduction

The world is changing very rapidly. Technology is most relevant reason for development of the world. In the past human just satisfied their basic needs but with the time wants were created in huge amount and human seek a way to fulfill those needs and wants. Information technology does a vital duty in human life to make convenience & comfortable it's daily activities.

How about the mobile phone? Think a moment…..Can you do your daily activities easily without a phone? Answer is no. Now it has become a very essential item in human life. It provides safety and security too. Modern mobile phone is not limited to make a call. It has progress to so many features that can be done connected with internet. These newest mobile phones called, "smart phones". What is the significance of this smart phone? "A smart phone is a device that lets to make telephone calls, but also adds features that might find on a personal digital assistant or a computer. A smart phone also offers the ability to send and receive e-mail and edit Office documents".

Dr. Martin Cooper of Motorola invented the first practical mobile phone April 3, 1973 in New York. This technology was further developed & the so called Smartphone was invented by IBM in 1992.
Most of the people use mobiles just to make calls & texting. But it has uncountable options. This is an essential thing. In some cases; it is a

threat to organizations, because employees use these personal gadgets in working hours. So why can't we utilize this personal item in working place?

If this personal gadget used in working environment, it will generate benefit to many parties in the society. Organizations, employees & end users obtain benefits through an efficient & accuracy service. Insurance is an industry that matches well with features of Smartphone.

Why insurance industry?

World developed countries use phones in industrial level. It saves time; resources also increase convenience, efficiency and motivation of employees. Most probably this kind of technology is matched with industries that have plenty of connections with people. Insurance industry is one of the potential industries by using this mobile technology.

Insurance industry deals with many customers. Customer relationship is most important part of such industry. Identifying the problem, respond to problem quickly is definitely making competitive advantage to any company.

Be an insurance agent means it is very responsible and hard work, deal with lot of documents, updating details in branch collecting payments, contact and update details with branch and head office some are the major things to do as an insurance agent. Insurance industries in many developed countries use newest technology to make this complex process in an easy manner. Insurance industry makes a good contribution to the financial stability of the country. The

country's risk management is in a good shape where insurance companies are part of the financial market. So as a developing country, insurance industry is very important for the economic growth of the country. So it is valuable since the technological improvement taken place in Sri Lankan insurance industry. Through this article we expect to suggest some solution for that which is already use in world developed countries.

How that Mobile Technology use for Insurance Enterprise in world success companies

The impact of mobile technology extends to work environments in insurance. The mobile space now includes feature-rich and functional apps designed for agents, brokers, risk managers, claims adjusters, and other insurance professionals. The Distributed work forces, which are always important in insurance, are benefited from the real-time convenience of hand-held devices.

Some insurance companies in the world, have been already tested, the use of Smartphone in the work process of insurance agents. Followings are the abstractions from World Wide Web that is used Smartphone in industrial level.

- "Aon Benfield, First **American Title, and Travelers** have all released apps for agents."

- "The Network of **Vertafore** Users (NVU) released an app for Android and iPhone, to help its members navigate NVU conferences."

- **"Lloyd's of London** tested iPads as replacements of paper underwriting slips."

- "UK insurer Allianz implemented a wireless solution that transferred data from office computers to BlackBerry's carried by employees in the field"

Insurance enterprise has been particularly interested in this technology, which have large, high-resolution screens that are easy to pass around in meetings or presentations, and are often more convenient for data input than laptops or stylus-based tablets.

Employees can access real-time analytics, which are often critical in sales. Managers see handsets as faster ways of connecting to agents and brokers. The inclusion of cameras in tablets enables field personnel to capture rich media such as audio signatures from claimants.

Allianz Company says that this solution allowed their team to input data into the corporate system in real time while out of the office, yielding more time to meet with clients and work on deals. Further they say that mobile apps are also influencing insurance software vendors. When more and more vendors favor the emphasis on ease of use, social features, faster release cycles, and open-source approach common in app development.

2. Situation in Sri Lanka

The large number of insurance companies in Sri Lanka's very small insurance market is forcing companies to focus on quality and innovation. In its latest analysis of Sri Lanka's insurance industry RAM Ratings Lanka says, competition in the sector has increased reducing margins, and profitability is driven mainly by investment incomes. Although insurance is vital for economic development,

insurance is still very small in Sri Lanka. The segment only represented 32% of the country's GDP and 3.2% of financial assets. However, the sector is crowded. At present, there are 19 companies offering insurance services. Of these, concentrate solely on the life business while 5 focus only on the general sector.

That is about insurance industry. When concern on telecommunication industry, the latest news are,

- Close to 70 percent of the population has a mobile phone
- Ownership of mobile phone is much higher in the 16 to 35 age group
- There are nearly two million internet users in Sri Lanka, representing 14 percent of the population
- 1.2 million users access the internet weekly or more often with the majority being in the 15 to 25 years age group where internet usage is as high as 26 percent
- Approximately 46 percent of users access the internet through their mobile phones, 10 percent exclusively and 36 percent through a combination of modes including mobile devices
- Of the total number of users accessing the internet through their mobile phone, 42 percent went to social networking sites such as Face book.

3. History of Smartphone Technology

The first Smartphone was the IBM Simon; it was designed in 1992 and shown as a concept Production.

- The history of the mobile phone charts the development of devices which connect wirelessly to the public switched telephone network.
- The transmission of speech by radio has a long and varied history.
- Hand-held radio transceivers have been available since 1940s.
- Mobile telephones for automobiles became available from some telephone companies in the 1940s.
- Early devices were bulking and consumed high power and the network supported only a few simultaneous conversations.
- Modern cellular networks allow automatic use of mobile phones for voice and data communications.

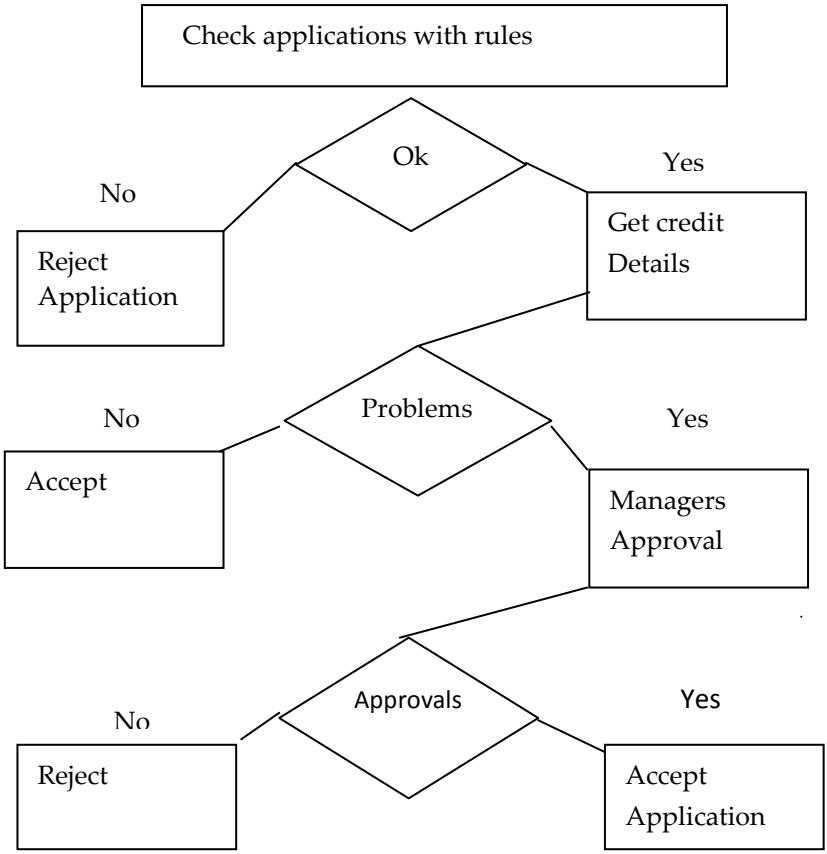
  Mobile phone history is often divided into generations (1st, 2nd, 3rd and so on) to mark significant step changes in capabilities as the technology improved. Today we are passing 3G, while entering 4G.

4. Opportunity to improve Sri Lankan Insurance Sector

Presently all the Sri Lankan insurance companies use manual process. It starts with need analysis of customer through that insurance agents make manual demonstrations of their products then after if client satisfied with that agent analyze the revenue and expenses of the client. Then he decides monthly payment and all relevant areas. If client accept the conditions then the proposal and takes some payment and issue some related to the payment by manually. Then after they collect details of transactions and batch wisely enter to the

system. Then form will forward to the unit supervisor for acceptance then he forwards it to the manager and through manager it finally forwarded to underwriter. If underwriter accepted it becomes to the policy. The policy of that transaction agent has the responsibility to collect monthly payments from the client.

Process of accepting an application



Drawbacks and limitation in current process

- **Long time consuming because of the batch process**

Because of batch wisely updating details of the customers to the system it makes long and complex process to the insurance cycle. Updating system with current process is very traditional. Because of that efficiency is very low. Country like Sri Lanka insurance market is very narrow because of high competition. So quickly response to the situation is very essential in this industry but with the traditional system it is restrict growth and efficiency.

- **There are threats of financial frauds through agents**

All the deals with the client do by agent and it is totally depend on agents' loyalty. Because system updated by manually so there are loopholes in the system. So because of that there are threats to financial frauds occur through agents.

- **Customers leave insurance policies**

There is no any proper continuous connection between customer and company. So it can cause to customers to leave the insurance policies.

- The damage claims is one of important part in the insurance company
- De-motivated work force
- Increasing transportation cost of agents and useless expenses.

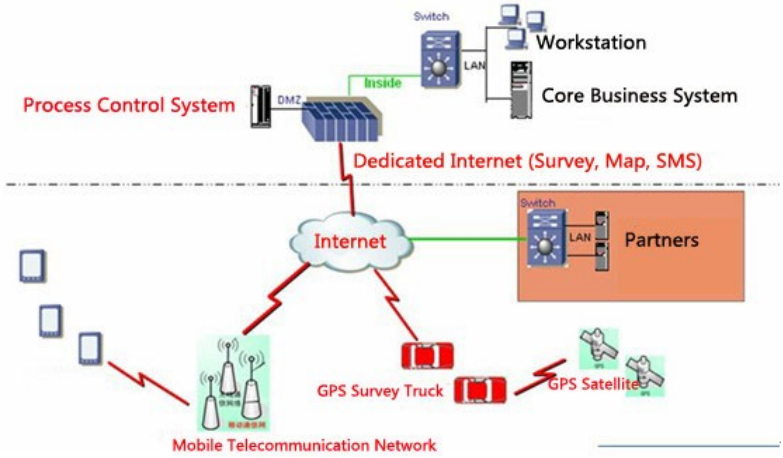
In the past, insurance companies usually assessed the damage claims by hand, which was complex, long cycle, low efficiency and low service quality. With the standardization of vehicle insurance more and more standardized and procedural, effective treatment and short processing time are becoming obvious requirements for Insurance companies, so that the policy holder could get fast and good claims service. Application of intelligent monitoring system could resolve this problem, which is becoming a trend. The demand of Insurance for

monitoring systems are mostly concentrated in the property insurance companies, among which the motor vehicle's remote damage settlement.

5. How Technology works in Smartphone.

Process with Smartphone

Previously all the process is handed by agents. They had to meet manager physically to get approvals& instructions. Now agents don't want to meet managers for everything. They can do the communication via their mobile phone. This technology works as follows. This is the technology of Smartphone. It is abstracted from World Wide Web.



Agents connect to the local area network through, radio waves, satellites or infrared light beams. All are networked. The networks of network or the internet has a dedicated internet to server, map or sms. Permitted persons can connect to that separate server & obtain service.

6. Potential Benefits and Missing Opportunities

- **Quicker response & immediate access.**

Under this chapter we further discuss what the potential benefits are in missed opportunities in insurance industry in Sri Lanka. Present process of this industry is traditional due to lack of quick response to the customer is a missing opportunity. But through new process that insurance agent can access internet and through that she/he can update details & system online. So immediate access to the system effect the profitability of the company.

- **Less reliance, ease of use & availability**

Another potential benefit is fewer devices to carry on by agents. Agents also motivate with their work & they cannot make any financial fraud because of proper system .The new technology definitely helps to make competitive advantage .This new system helps to quick management response, no more need of stationary works. Customer, agent & management verifications are very easy than traditional system.

- Customer satisfaction & motivated staff
- Create sustainable environment &reduce cost

Implementing of this new technology will be a gateway to the new world, because all other sector of economy will engage with Smartphone solution. Presently most of banking sectors & many organizations use innovative IT solutions for their work process.

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Turny Evo System: Independent Life Style for 'Differently- Able' People

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1. Introduction

There are millions of people in the world who are unable to walk and work like other people in the society. Some of them are become disables by birth, but the majority become disable by life activities. With the increase of disable people in the society, general attention and attitude toward them have also drastically changed. In most of the countries disables were started to recognize as "Differently-Able" people. This relatively new term suggested that, even though disable people cannot do the live activities as normal people in the society, they also can do those life activities in different ways. Therefore, society needs to find innovative solutions to help differently-able people to get involved in day today life activities. In most countries differently-able people are well protected and they were given equal opportunities in public transportation, employment and accommodations.

According to the 2001 population survey report 8-10% of the people in Sri Lanka are disabled. However, this number has increased rapidly during last decade. There is large number of people become differently able due to the recently concluded civil war. Not only personnel from army forces, but also large number of civilians have become differently able. Among them, there are large number of

children and young people. They have to deal with the difficult life ahead of them. Apart from that, Sri Lanka is one of the countries who have rapid increase of older people in the society. Therefore, sooner rather later, there will be very high number of disable population in Sri Lanka. Therefore, modern technological innovations available to help differently-able people need to be given attention and adoption in Sri Lanka.

2. Technology for Differently-Able people

There are special government, non-government and business entities who have involved in research and development to develop innovative solutions to make life easier for the differently able people. There are number of specialized products and services available in the market that help the differently able people in the world. Apart from creating specialized products and services, world trend has shifted towards customizing available products and services to make them suitable for differently able people.

People with limited mobility have a challenge to getting into a conventional vehicle. Not only do they have to put aside their crutches or get out of their wheelchair, but they are also required to step up and across the vehicle's door sill and swivel themselves sideways onto the seat. One option is to get a converted van, with a side- or rear-mounted ramp. However, converted vehicles firstly, are very costly and secondly, they make the differently able people

psychologically uncomfortable by generating feeling as uses of specialized vehicle for disables. Therefore, converted vehicles do not bring the normal life to the differently able people. The Swedish company's Autoadapt was able to make acceptable alternative to make conventional vehicle that suit to differently able people.

3. How Turney Evo System Works

Autoadapt was founded in 1996 and has since grown to one of the world's leading manufacturers of car adaptation solutions for people with reduced or limited mobility. The company offers a wide range of award-winning and safety tested solutions for adapting vehicles for increased accessibility.

The Turny seat lift and Carony wheelchair system are innovative products that eliminate the need for lifting a person into or out of the vehicle, making the disabled and elderly user more independent. Turny Evo system actually lifts the front driver or passenger seat out the door of the vehicle, turns it toward the user, and lowers it down. Once the user has seated them, the seat and passenger are then pulled back inside, and driving can commence. The Turny Evo has passed the safety tests in compliance with the current directives. To make the Turny Evo easy to use, it has hand control with informative display window. It lets the user know which of the 4 buttons to press and it also indicates the status of the Turny Evo.

When seated inside the vehicle, it's easy to adjust the seat position forwards and backwards by using the hand control.

The streamline design of cars today have made more harm than good for those who have trouble getting in and out of the car. The tight design leaves very little room to swivel a seat out of the car, an issue

the design engineers at Autoadapt solved with a unique customizable path of movement. This makes it possible to make optimum use of the space in the doorway and creates more room for the user. According to Autoadapt, the crash-tested system can be installed on the majority of SUVs, minivans, minibuses, crossovers and similar vehicles. The layout of every make and model is different, of course, so the Turny Evo's path of movement can be programmed to accommodate whatever vehicle it ends up in.

Turny Evo key User benefits compared to previous model:

- Allows installation in more vehicles and/or more leg space due to optimized swivel geometry
- The seat can be lengthwise adjusted when inside the vehicle
- The unlimited backrest reclining provide more head space and better comfort
- Integrated foot rest
- Advanced pinch protection
- Easy emergency-mode operation
- Elegant and slim design

4. How Sri Lanka can adopt Turn Evo System

The majority of vehicles uses in Sri Lanka are imported from Japan. However, today Sri Lanka has its own vehicle manufacturing company; the Micro car company. They manufacture wide range of vehicles for different price ranges. If Micro Company gets the patent licenses from the Autodapt Company or get the turning seats from Aotodapt, they would be installed in their selected vehicles. This strategy would help Sri Lanka to learn about the Turn Evo system, while allowing differently-able people gain independence in travelling.

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Environmental Ecology

"...Natural environment is the foundation on which poverty reduction efforts and sustainable development must be built. People everywhere in the world depend critically on environmental assets and energy resources for their livelihoods and well-being. It is widely accepted that recent and ongoing global distresses such as food, fuel, financial, climate change have linked to environmental issues related to the misuse of the environmental systems. Therefore there is a necessity and tendency on developing environmental friendly technologies that can help to re-establish the environmental condition that will sustain for the benefit of future generations…."

UNDP

Possibility of Solving Garbage Problem in Colombo using Waste-to-energy (WTE) technology

Gihan Lalantha
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1. Introduction

Colombo a city known for more than 2000 years ago by the ancient traders is the Capital City of the Paradise Island, Sri Lanka. It's a vibrant city with a mixture of modern life and busyness. Colombo city comprises of a population density of 268 per KM^2 in 2010 and it has an annual population growth rate of 2.24% where the total population counts up to 1,000,000.

Due to Sri Lanka's strategic location and the ending of the 30 year civil war, Colombo heavily anticipates foreign investments. However despite all factors Colombo still lacks a proper solid waste disposal mechanism. This is the sole responsibility of the Colombo Municipal Council. In the Present context many developing cities are taking radical steps to become environmental friendly but unfortunately Colombo does not reflect such an endeavor.

Although Sri Lanka generates power or electricity mainly using water and oil; day by day much more expenditure is being added. Therefore they found other electricity producing mechanisms. So the waste to energy technology is more cost effective way of generating electricity at present. It gives additional benefits compared to other thermal methods.

2. Situation in Sri Lanka

Garbage collection is one of the main functions performed by the Colombo Municipal Council but still there is a rapid increase in garbage dumps within the Colombo city due its inefficient management.

Sri Lanka's biggest garbage dump is located at Bloemendhal road, in the midst of the city. This is not a segregated garbage mountain from all sources collected by the Colombo Municipal Council. At present it is estimated that there are 58 unmanaged waste dumps in the Western Province, most of which are almost filled to its maximum capacity. However this has given rise to many health and social issues in the areas.

Seven hundred metric tons of garbage was generated during the early 90s in the Colombo metropolitan area and now it has almost tripled. At the national level, more than 40,000 tons of hazardous waste is being produced per annum. Solid and hazardous waste is unloaded into open dumps causing serious health hazards such as diseases spread by mosquitoes. During the last two decades dumping has destroyed almost all the wetlands around Colombo.

In certain locations concrete bins are being placed in order to dispose garbage. But unfortunately these have been totally neglected by people due to the absence of a proper procedure to monitor its usage. Many drains and sewers in Colombo are being blocked due to garbage which causes heavy flooding in Colombo during the rainy season. Treatment of hospital waste is not being done accordingly which also ends up in common dumps.

It is indeed necessary that Colombo needs a proper solution for garbage disposal. Therefore, using modern technology available in the world, we suggest an alternative way of treating garbage.

3. History of the Technology

Waste to energy technology is a process which involves converting various elements of municipal solid waste such as paper, plastic and woods into a form of energy (mainly electricity) this process could be done either though a thermo chemical or a biochemical process. In a more simplified way this could be explained as a process which creates energy with the usage of waste. More advanced waste-to-energy processes result in usable fuel commodities, such as hydrogen or ethanol.

Waste-to-Energy involves the use of modern combustion technologies to generate energy, usually in the form of electricity and steam, from mixed municipal solid wastes. These new technologies can reduce the volume of the original waste by 90%, depending upon the composition and the use of outputs.

Waste to Energy was originally found in Germany during the 20th century as a result of increase in the energy requirement and the increase in the wastage in the cities. However in terms of Waste to Energy conversion Singapore has been recognized as a country which has benefitted by this technology.

Singapore is a Southeast Asian city state off the southern tip of the Malay Peninsula. Over the past years, Singapore has shown a rapid development as it has now been turned into one of the world's biggest business hubs, which is second only to New York, Tokyo .With the rapid population growth in Singapore faced a critical of garbage disposal. Over the past years; Singapore's generation of solid waste

has increased significantly, from 1,260 tons per day in 1970 to reach the highest of 7,787 tons per day in 1998. In 2008, Singapore produced 2.63 million tons of incurable solid waste.

During 1960's to 1970's Singapore heavily relied on land fill areas around the island in order to dump waste. But later the Singaporean government realized that this cannot be continued for ever as with the islands space constraints as it would create to a critical issue leading to a range of environmental and social impacts. Therefore this made the Singaporean authorities to think of an alternative method for solid waste disposal.

As the alternative method for solid waste disposal Singapore came up with a solution to convert waste into energy. This is known as Waste-to-energy incineration. Waste-to-energy incineration was found to be the most cost effective options as it can reduce waste volume by more than 90%.In 1978; the first waste-to-energy (WTE) plant was opened. Today, the solid waste disposal infrastructure consists of the four WTE plants located in four areas in the island.

4. Operation of the Technology

Waste to energy refers to any waste treatment that creates energy in the form of electricity or heat from a waste source that would have been disposed of in a landfill; this could also be known as municipal solid waste. Waste-to-energy is a renewable energy because its fuel source, garbage, is sustainable and is not depleted. We called this process Waste-to -Energy incineration.

Waste-to-energy plants operate more like a coal- power plants.
Where the only difference is the fuel source; Waste-to-energy plants uses garbage as the main input.

The Waste Energy Incineration Process could be explained in a few simple steps as follows;

1. Waste which will be collected will be transported to a waste incineration facility and stored in a bunker.

2. Thereafter the solid waste will be put to a special combustion chamber where self-sustaining combustion is maintained at extremely high temperatures.

3. The heat from the combustion process boils the water which is stored in large tanks. The steam generated through the boiled water will be used to drive a turbine. The driving of the turbine will lead to the generation of electricity.

4. Electricity is distributed to the local grid.

5. Ash from the combustion is processed to extract metal for recycling. It is then combined with residue from the air pollution control process.

6. The combined ash is either disposed in a place where only ash is disposed or else it is used for land filling.

7. All gases are collected, filtered and cleaned before being emitted into the atmosphere. The plant should manage the gas created from the combustion process with state of the art air pollution control technology that operates to state and federal standards.

8. Plant will monitor criteria and other pollutants and operating parameters to ensure compliance with the environmental requirements.

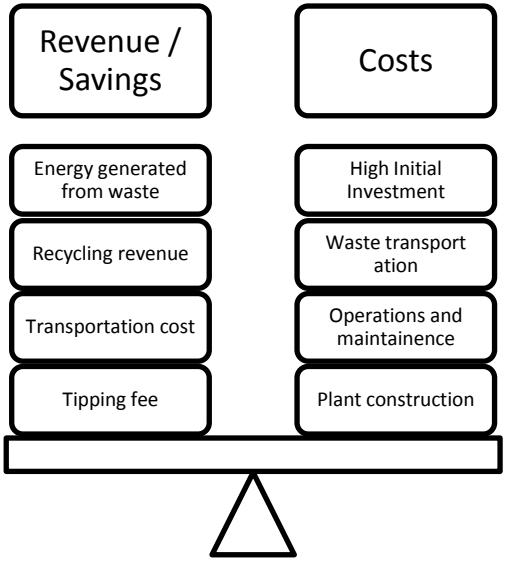
5. Potential Benefits

As mentioned in the very beginning Colombo is facing a critical issue relating to garbage disposal. With the increase in garbage dumps in the city it will definitely create high social and environmental impact. In addition it will adversely affect the city's attraction.

Therefore as a solution the Waste-Energy-Inclination process could be introduced to Colombo. This will be a cost effective option which will reduce the waste by 90 %. However the facility needs to be located outside Colombo metropolitan area but within the Colombo district, this is due to the space constraints in the Colombo metropolitan area as the facility will require a large area.

The Colombo Municipality Council spends around 2.1 Million rupees for waste collection per day and this is more than 600 Million Rupees per annum. This amount could be saved after the opening of the Waste-Energy-Inclination plant. In addition, electricity generated through this plant will generate revenue through its distribution. The facility will reduce the environmental impact and will fulfill a significant proportion of Colombo's electricity requirement.

When considering about the revenue and the costs of the waste to energy incineration process, it can be depicted as follows.



1. The 2.1M paid on garbage disposal could be minimized significantly with the opening of the plant. The money saved could be invested in the plant.

2. The municipal waste to energy process does not rely on fossil fuel, and this means that the dependence on fossil fuel could be reduced and there will be a reduction in foreign exchange outflows

3. Domestically produced energy is a radical development of a country, and municipal waste to produce energy is a good opportunity.

4. Using trash to generate electricity can help bring stability to both the cost of the electricity and availability. With this process there are no wide fluctuations or shortages.

5. Municipal waste to produce energy facilities are locally situated and this offers many advantages to the community such as creation of job opportunities, reduction of foreign exchange outflows, and providence of energy for a reasonable cost. And that does not pollute or harm the environment too.

6. Greenhouse gas emissions play a big role in global warming, and this alternative energy generation method does not release high volumes of emissions that fossil fuel power plants do. Therefore it will reduce the impact on global warming.

7. Using waste to generate energy is a process that does not harm any living being.. There are no dangerous chemicals or toxins used to contaminate the land and water in the area. Pollution and greenhouse gas emissions are far less than using coal or other resources.

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When Smoking become a Problem, How Technology can be a Solution

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1. Introduction

Cigarette smoking is a huge social problem which gives adverse effects to the whole world. Smoking influences not only the smoker, but also to non smokers (Second hand smoke). Therefore, cigarette smoking has multiple negative impact to the human society. There are serious direct effects which can be affecting the smokers as well as the non smokers who are staying around the non smokers. A cigarette definitely leads to heart and lung diseases. Such as

- Heart attacks
- Chronic Obstructive Pulmonary Disease
- Emphysema
- Lung cancer
- Cancers of the larynx and mouth
- Pancreatic cancer

People who have smoked tobacco at some point have about a one in ten chance of developing lung cancer during their lifetime. Thus, this risk affects to second hand smokers as well. When it comes to the macro level effect analysis of smoking, national life expectancy is also decrease among both smokers and non smokers. Smoking is harmful to the ovaries, potentially causing female infertility. Nicotine and

other harmful chemicals in cigarettes obstruct the body's ability to create estrogen, which is the hormone that regulates folliculogenesis and ovulation.

Number of studies has shown that tobacco smoke adversely affect the pregnant ladies, children's lower birth weights and disordered behavior. According to medical articles, smoking indirectly affects the domestic life also. Smokers have a 53% chance for divorce than nonsmokers. The usage of tobacco can also create cognitive dysfunction. Smoking has been found to contribute to dementia and cognitive decline, reduced memory and cognitive abilities in adolescents, and brain shrinkage (cerebral atrophy). Therefore, smoking is **a** national level problem that negatively affect on socio economic development of a country.

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2. Smoking as serious world threat

Today, tobacco consumption is accepted as the single greatest cause of preventable illness and early deaths of young people. Around 107,000 people died in 2007 from smoking-related diseases including cancers in the UK. Around 86% of lung cancer deaths in the UK are caused by tobacco smoking and, also, the International Agency for Research on Cancer (IARC) states that tobacco smoking can also cause cancers of the following locations of the body: upper aero-digestive tract (oral cavity, nasal cavity, nasal sinuses, pharynx, larynx and esophagus), pancreas, stomach, liver, bladder, kidney, cervix, bowel, ovary (mutinous) and myeloid leukemia. Overall tobacco smoking is estimated to be responsible for more than a quarter of cancer deaths in the UK, that is, around 43,000 deaths in a single year. According to WHO estimates, each year tobacco kills nearly 3.5 million people

across the world. It is estimated that tobacco kills 80 times as many people as AIDS and 85 times as many people as illicit drug uses.
Smoking as well as oral use of smokeless tobacco is widely prevalent in South Asian countries. Studies conducted in India and Sri Lanka has shown that the habits of tobacco chewing and smoking are highly connected with oral cancer and pre-cancer. Oral cancer is one of the common cancers in Sri Lanka. The dangers of tobacco are not confined only to its adverse health effects; the socioeconomic and environmental consequences of tobacco have even greater adverse effects on the world population.

Tobacco use is the leading cause of preventable illness and death in the United States also. It causes many different cancers as well as chronic lung diseases, such as emphysema and bronchitis, and heart disease. Cigarette smoking causes an estimated 443,000 deaths each year, including approximately 49,400 deaths cause due to exposure to secondhand smoking in the USA. The lung cancer is the primary cause of cancer death among both men and women in the United States. There were 90% of lung cancer deaths among men and approximately 80% of lung cancer deaths among women are due to smoking. People who smoke are up to six times more likely to suffer a heart attack than nonsmokers, and the risk raises with the number of cigarettes smoked.

Above factors emphasize that threat of the smoking and there is a great social responsibility to control this disaster. But smoking is an

unethical behavior which cannot be entirely eliminated. Therefore we should try to reduce the threat of smoking at least to the people who are around the smokers. Following legitimate solutions are available in the Sri Lankan context.

- Smoking is prohibited in public places.
- Selling cigarettes to children (under 21 years old) is prohibitted
- No permission to advertise
- Warning sentence **shown** in the cigarettes box.
- Imposing high tax

However, none of these measures are able to reduce the negative effects of smoking. Even though, these legal boundaries may be effective in reducing the number of cigarettes consumed, the negative effect of a single cigarette will not be eliminated.. Therefore, addicts will not be benefitted by these regulations. This is the requirement of introducing cigarettes that does not have poisonous chemicals in the smoke.

3. Electronic Cigarette as a solution for addicted users

Although there are such several legitimate solutions in the society, these are not technical solutions to reduce the negative influences of smoking. The electronic cigarette concept first appeared in a patent acquired by Herbert A. Gilbert in 1963. The device was described as, "...a smokeless non-tobacco cigarette ... to provide a safe and harmless means for and method of smoking by replacing burning tobacco and paper with heated, moist, flavored air..." Due to the limitations of technology available at the time, and because tobacco was not yet generally accepted as harmful, this device never reached to the market at that time. However, in modern society smoking is

recognized as harmful human behavior. Therefore, electronic cigarette is becoming a necessary product that should available in the market.

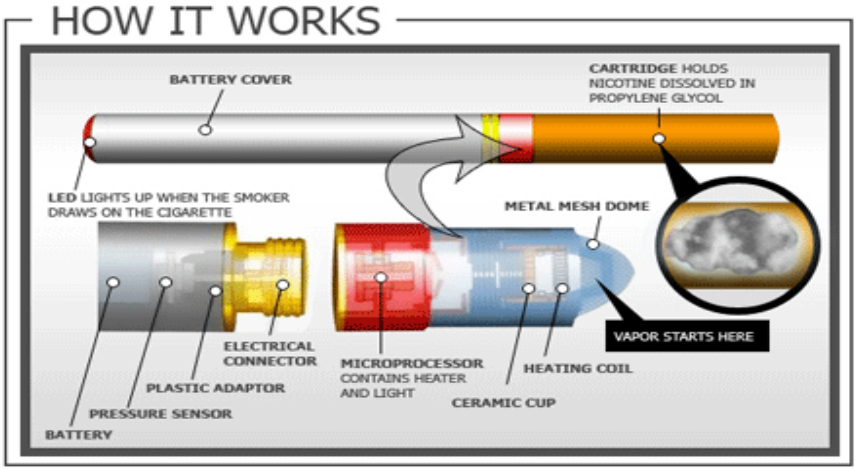
The modern electronic cigarette was invented by Chinese pharmacist Hon Lik in 2003 and introduced to the market the following year. The company he worked for, Golden Dragon Holdings, changed its name to Ruyan (meaning "to resemble smoking"), and started exporting its products in 2005–2006, before receiving the first international patent in 2007.

An electronic cigarette, generally known as an e-Cig or personal vaporizer, is a system that permits smokers to inhale specific amounts of either nicotine or non- nicotine vaporized solutions. There are electronic cigarettes that have the appearance of an actual cigarette, but some other versions do not look like the traditional cigarettes at all. The E cig provides a clean and comfortable smoking substitute. With e-cig smoking products there is no more stale tobacco smell on smokers' hands, clothes, hair, or furnishings. E-cig is free of ashes, dirty cigarette butts, and that lingering tobacco smell. Smokeless cigarettes look like traditional cigarettes, but there are some significant internal differences.

4. How E-Cigerate works

The e-cigarette doesn't contain any of the harmful substances that are in a traditional cigarette, such as tar or carbon monoxide. Best of all, there is no toxic smoke. The basic set up of every electronic cigarette consists of a mouthpiece, a heating element as well as a rechargeable battery. The battery of course is required as this is what allows the heating element to get triggered which in turn heats up the liquid solutions that get vaporized once the smoker inhales. The vapor delivery system is actually contained in replaceable cartridges. A

membrane holds the ingredients within the cartridge and each electronic cigarette cartridge contains a minimum of water, propylene **glycol** or vegetable glycerin, and usually some sort of flavor.



In E-cig, there is a heating element that gets activated when inhaled through the electronic cigarette. The actual flavored liquid mixture is kept in the mouthpiece of the electronic cigarette and this liquid mixer is heat sensitive. So, what happens is the liquid mixture within the mouthpiece gets vaporized once the heating element gets triggered. When the liquid is reacted to the heat it creates the vapor and smoker is able to inhale the vapor from the electronic cigarette.

Some electronic cigarette designs are made to activate the heating element automatically that delivers vapor immediately once the cigarette's sensor is tripped when the smoker inhales. Other designs require the smoker to push a button in order to activate the heating element. Most models also feature a LED which emits a glow at the tip of the electronic cigarette which simulates the glow of a regular

cigarette. However, if want to draw more attention to the device, can sometimes pick nontraditional colors for the glow at the tip.

5. Elements in the E-cigarette

Batteries are not necessarily new inventions of the 21st Century. However, creating the technology that can place the battery into a cylinder shaped like a cigarette is new. There had to be ways to charge the batteries while they were not in use. Electronic cigarette batteries can now be charged with wall chargers, car charges, and even computers via USB ports. That is new technology.

Microprocessors utilize high frequency technology to activate sensors and atomizer. Smoker will not find switches or buttons on new electronic cigarettes. Microprocessors and sensors work at the point of beginning to inhale without any further physical manipulation. Atomizers turn the mixture of water, nicotine, and flavors into a vapor like mist. Atomizers are fancy heating elements that do not require matches or lighters to provide heat to produce the desired reactions. Heat production in this manner and with electricity is the work of current technology and development and not something out of the past.

The vapor mist created is primarily made up of harmless water. The vapor mist is then inhaled just like smoke to deliver nicotine into the user's system. Nicotine delivery without all the seriously questionable chemicals that were found in regular cigarette smoke resulted from technological advances. Technology finally eliminated the need to mix the wanted ingredient – nicotine – with highly toxic chemicals that are unwanted.

There would be no electronic cigarettes without the newly developed technologies behind them. People would still have to mainly return

to smoking regular cigarettes that are extremely harmful to their health and people around them that do not smoke at all.

The technology behind electronic cigarettes was driven by a much broader purpose than simply making a better nicotine delivery device. Nicotine can be delivered in gum and patches now. What smokers missed most was the overall experience of smoking. Smokers needed to feel something in their hands. They wanted something to do with their mouths and lungs. Technology has supplied the means to recreate the entire smoking experience down to a LED light that burns red at the tip to simulate the flame on a regular cigarette. The consistency of the vapor mist of electronic cigarettes is almost same as the regular cigarette smoke (minus all the adverse chemicals of course). Technology has brought healthier smoking habits into the new millennium. There are some significant advantages of the e- cigarette;'

- Electronic cigarette does not contain 4,000 chemicals, carcinogens or tar found in tobacco cigarettes.
- There is no second hand smoke for e cig.
- Electronic cigarette looks, feels and tastes like a normal cigarette
- E cigarette includes of purified nicotine satisfies cravings thus making them a genuine alternative to a tobacco cigarette.
- E cig is not flammable and therefore not a fire risk.
- Electronic cigarette is less expensive when compared to smoking normal cigarettes.
- E cigarettes have no ash or butts.
- E cig is odorless - no smell clinging to your clothes or furniture and no bad breath.
- Electronic cigarette are designed to satisfy both the psychological and physiological effects of smoking.
- Rechargeable
- Smokeless

6. Conclusion

Tobacco and smoking has a long and checkered history. Today, it has become a huge social problem because of adverse effect of smoking influence both smokers and second hand smokers. As a solution to this problem, E-Cigarette has been introduced. The E cig provides a clean and comfortable smoking alternative that looks, tastes, feels, and acts like a cigarette but doesn't actually produce any "real smoke". Smokeless cigarettes look like traditional cigarettes, but there are some differences. The e-cigarette doesn't contain any of the harmful substances that are in a traditional cigarette, such as tar or carbon monoxide. The best of all is that there is no smoke.

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Pavegen Technology to Convert Footsteps into Energy

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1. Introduction

Electricity is most fundamental requirement of industrial and the day-today lives of the organizations and people in modern society. Even though, highly industrial countries generate power in nuclear power plants, hydro, diesel and coal power generations are the most defiantly and effective ways to generate electricity power in developing countries. Owing to the drastic decrease of power generating sources, cost of electricity generation has increased in most parts of the world, including in industrial countries. In present, solar power, hydro power, wave power, air power use as alternative methods of generating power. Usually hydro power, air power and solar power are relatively cheapest ways; however, due to geological barriers there are no much opportunity to use these methods in large. This has become a main problem for future world.

Today's renewable energy sources such as wind, solar or hydroelectric are not designed to function well in urban environments where there is limited space, high population density and lack of sunlight due to tall structures. Therefore, most of countries have tried to innovative efficient electricity power sources for their distress. Industrial countries have moved to research and development to find cheapest

way to generate power for their daily activities which achieve higher standard of living. Governments and privet sector spend lot of fund to find an alternative method to develop innovative electricity power technologies. As a result of among this research and development efforts, lot of countries have found innovative methods to generate electricity power.

2. Footsteps as Wasted Kinetic Energy

Kinectic energy is the energy that generate by the motion. Kinetic energy is an expression of the fact that a moving object can do work on anything it hits. There are thousands of kinetic energy sources in day-today life. However, most of the sources are unused and unknown to be able to generate power.

There are millions of people walking around the shopping malls, roads, railways stations and even in bus stations. Even though, the person who walk does not realized, each step he move forward create kinetic energy. As far as there is no mechanism to capture this kinetic energy it has been wasted until innovative England Company has found an innovation to generate electricity using kinetic power of walking.

Especially in developing countries like Sri Lanka, India, Bangladesh people are more often use public transportations services for their day-today travelling. Therefore, millions of people walk around the public transportation stations in daily basis. This generate large sum of kinetic energy that can be used to convert into electricity. However, there was no any technology to capture this footstep kinetic energy since the Laurence Kembell cook invented the PaveGen tiles.

3. PaveGen Tiles

Laurence Kembell-Cook, the director of PaveGen Systems imagined it and created PaveGen tiles - a low carbon solution that aims to bring kinetic energy collector to the streets. The tile is receiving a serious of attention as an answer for power-hungry cities with a lot of walking traffic.

Today's renewable energy sources such as wind, solar or hydroelectric are not designed to function well in urban environments where there is limited space, high population density and lack of sunlight due to tall structures. Owing to a lack of power generation sources, PaveGen tile suites the urban environments. The PaveGen tile solution is designed to meet the energy needs of an urban setting. It can be integrated into existing buildings, requires no new infrastructure and performs better in areas where there are more people. Millons of people used to walking cities every day. Sometimes people walk few miles daily with thousand folds of steps. But they never imagine that each step we make can produce electricity.

Sometimes you may see whether Michael Jackson's music video for "Billie Jean", that video where the sidewalk tiles lit up whenever the King of Pop's step would touch them. It is only made up video. But is it tiles actually exist? There is no need to surprising. The PaveGen tiles are especially designed for sidewalks of streets, schools, super markets corridors like full of people. The technology can convert the kinetic energy of steps into electricity and then use in a variety of applications. Such as power up street lamps, power up

advertisements lamp box, floor lamps, pedestrian crossing lights, alarms, speakers etc.

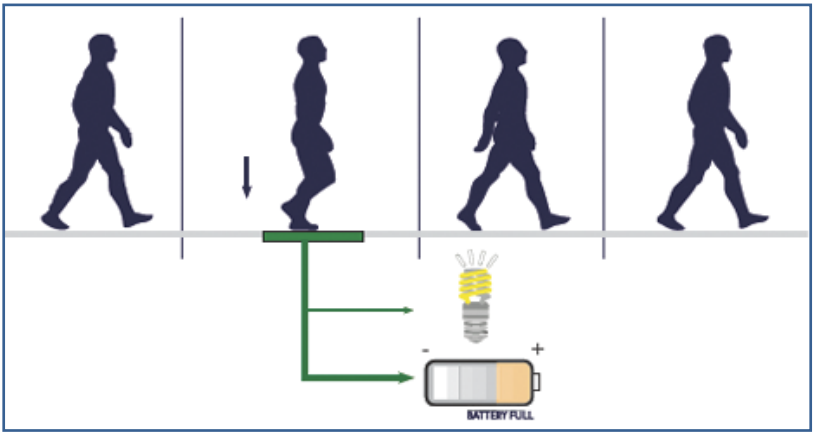
The Pavegen represented to the public recently as dancing floor with musical stage. That was their public ceremony. There are currently being used in a school lobby where they are helping to the school energy needs. Pavegen received its first commercial order for the 2012 for London Olympic. They signed an agreement that they will be installed at a crossing between the Olympic stadium & shopping centers.

4. How PaveGen tiles works?

The PaveGen tile still is in the development stage. They get untiring efforts to improving quality and it's benefits. However their targets were achieved by them. The Pavegen tiles themselves are completely eco-friendly. The entire casing is finished by the marine grade stainless steel and recycled polymer with low carbon concrete. The top exterior is built entirely of old truck tires that are not only a enormous use of recycled material and also make the tiles durable throughout years on any weather. It also has LED light as the first design. The waterproof tiles are made from 100 percent recycled rubber and each tile is reported to have a life span of 5 years or 20 million steps. Otherwise they decided to design a slab. That can also store energy for up to three days in an on-board battery according to its creator.

The Pavegen floor tiles flex a slight 5 millimeters when stepped on, capturing kinetic energy which is either stored in lithium polymer batteries beneath its surface or converted into 2.1 watt-hours of electricity and distributed throughout surrounding lights. The center of the tile illuminates when stepped upon. As the inventor said,

although each step produces only enough electricity to keep an LED-powered street lamp lit for 30 seconds.



Source: http://www.futurepowersolutions.co.za/PaveGen.html

This is a new innovation not only informing the casual observer of their contribution to the environment. But it also promotes the continuation of sustainable awareness and decisions. The first designs were aimed at illuminating small spaces like bus stops, ticket machines, refrigerators, and shop signs, but with a large number of Pavegen, the possibilities are nearly limitless, as the inventors' view of point.

5. Conclusion

PaveGen technology is new and patented technology. Therefore currently it is very costly. However, it is very beneficial for the third world country like Sri Lanka to minimize the electricity generation cost, especially for non-income earning electricity usages. Even though the Pavegen would not be capable to replace the diesel or coal power generation, pavegen tiles can be used in crowded palaces such as bus stands and railways stations to generate and store electricity to light the street lights. As far as street light electricity is unavoidable need, this pavegen technology would be ideal as an alternative energy source in Sri Lanka.

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Sustainable Information Technology: Grow With Green IT

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1. Introduction

With the recession of the world economy, most of the companies have adopted IT related environment in to the business process with the intention of minimizing the operational cost arising from the formal manual operational activities. Therefore almost all of the business firms throughout the world have used or may using an IT system either in a major scale or minor scale irrespective of the type of the business operation they have engaged in.

In 2002, there was an estimate of 592 million PCs in the world and this was estimated to rise up to 4 billion by end of 2020 indicating the increasing trend of the computers and IT related systems within the business firms and even in the domestic usage in the world.

As far as the increasing trend of PCs and other IT related components are concerned, the factor to be considered is not the money saving to the business, but the carbon footprint generated from such devices. Although this has been a major issue for the global carbon emission, it seems that most of the companies around the world still do not emphasis on such carbon footprints.

Approximately IT accounts for two percent of world carbon dioxide emission (CO_2) and this figure is about to rise for three percent by 2020 with the estimated increasing figures of PCs around the world at that time. This estimation of carbon emission is more proven through the past data, as it mentioned by the global e-sustainability initiative (GeSi), a group representing the UN environmental program and several other leading companies, IT caused CO_2 emissions have doubled between 2002 and 2007 and are expected to be triple by 2020.

2. What is Green IT?

This IT CO_2 emission has been recognized and addressed by some companies, especially the European and US companies, stating that they have a clear intention towards reducing carbon emissions from their IT systems, and they have emphasized that, although the recession led them to utilise more and more IT into their businesses, they still not getting the perfect benefit out of it, as long as the carbon cost and energy cost linked with such IT mechanism. Therefore many have found that there are substantial cost saving to be made from adopting Green IT principals – reducing energy and equipment costs and driving grater efficiency in working practices and procedures.

Greener IT refers to environmentally sustainable computing or IT. In the article *Harnessing Green IT: Principles and Practices*, San Murugesan defines the field of green computing as the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — in optimal efficient way with minimal or no impact on the environment.

Green IT is also described as the study and the using of computers and related equipments in an efficient way. Therefore Green IT considers about manufacturing or producing environmentally friendly products while encouraging IT functions to be more friendly with the options like virtualization, power management and proper recycling habits which reduces the CO_2 emission from IT. These include using low- carbon emission building materials, recycling of equipments, using alternative energy sources, and other possible green technologies, etc.

Considering the Pioneer adopter of Green IT, 1E is the global leader who invented this IT solution in a more efficiency way. Their main emphasis regarding the IT is to reduce the unused IT from its operations and to optimize all the other relevant activities hence reducing the energy consumption while reducing the carbon emission generated from the IT. To date 1E has helped more than 1600 customers to make savings of $ 1.4 billion including a $ 800million with together the reduction in CO_2 emission of 6.4milloin tones.

3. State of art in global IT culture

With the consideration of above stated wastes in energy costs and so on with the carbon emission generated out of IT systems, some of the UK based and US companies have already adopted the technology of green IT techniques into their company cultures, and have been able to achieve the highest states in terms of IT usage and so called minimizing carbon emission which we consider as the **State of Art** for those companies in terms of IT usage.

There are various approaches used by IT experts on this adoption of green IT contributing to a huge savings to companies."

Virtualization", is a one technique used where, a one single server is portioned into several virtual machines, consolidation, modeling of air flows between machines and eliminating heat loss hot spots, (**source- Amazon.com-Greener IT**). All of these techniques can reduce the carbon emission and costs relating to a particular major scale IT system. For example, IBM has consolidated 3900 servers on 33 mainframes which led them to an 80 percent savings on energy costs, with together the savings in floor area and property charges.

With the introduction of power management software, some of European companies have been able to save lot of energy costs by switching off the PCs in unnecessary hours without losing any data or information or without harming to the daily operations of the companies. According to Jon Bentley, IBM smarter energy lead, by using such power management software, a company can save up to 40 percent of energy waste, which in terms of $300 million or 1.3 million tones of CO_2 and this saving could be more elaborated to an even higher figure such as $ 16,800 per year on a fleet of 1,000 PCs, according to the company.

HSBC, one of the users of such power management software, stated that they expect to save $1 million worldwide by adopting such techniques. Jon Bentley describes that a business can save approximately $ 32 per one machine per annum, where if you have thousands of machines, the saving will be also in terms of $ thousands figures to your company.

Again Jon Bentley explains that there could be more opportunities at outside of the offices, where IBM is currently working with a major UK based retailer to power down its 2000 point of sales machines when stores are closed. The saving out of this operation is yet has not

been calculated, but the result from the savings could be in a considerable amount, says Bentley.

A survey in 2010 found that more than two third of European companies have adopted Green It in to their company cultures by investing on such Green techniques, while a further more 9 percent is expected to adopt more Green technologies by the end of the 2012. Compared to UK, US companies have a marginal ahead of such adoption of Green IT techniques in to their systems and this may mainly due to the legislations situation within the US relating to the companies in CO_2 emission and other energy sources.

4. Sri Lankan IT culture in depth

Sri Lankan companies are also now interested in adopting green technologies into their systems. Although some companies have already introduced such green solutions, any sign of IT related green solutions are still unseen by such companies. For Example, Sri Lankan Airlines has now adopted the UK green techniques into their operating system and for air crafts, but no evidence for such usage in IT green solutions is available, although Sri Lankan Airlines is a massive user of large mainframe machines within their premises.

This kind of a situation emphasizes that within Sri Lanka we are still not much keen on saving our power usage in IT and any other carbon emission generating out of such systems. This may be mainly due to the lack of wider imagination of the companies and also may be due to the short term planning on maximizing the profits and cash flows rather than installing such systems into the IT culture within the companies. This situation is apparently witnessed by the fact that, most of the Sri Lankan companies have not yet even attempted to save

some massive carbon emission generated fields such as cooling systems within the companies, super markets, etc.

With such a situation, green IT is far more target to be achieved by the Sri Lankan business culture, although there could be so many finance and even non finance advantages can be generated out of it.

According to Jon Bentley, identifies three main reasons to fail with such inefficient IT system.

- Departments make decisions based on their own need, without reference to a wider procurement policy.
- Companies worry about satisfying new IT needs, sometimes forgetting the equipment they already have
- IT staff fail to design network for efficiency, building in the application that share information but place few limits on storage.

Due to the above failures within an IT system, a company could generate a massive amount of energy waste as well as huge figures in carbon emission pulling back words the company's profitability and sustainability in both short term and even in the long term. Therefore this could be a negative situation for Sri Lankan companies where currently they are trying to cope with the global standards and global issues on carbon emission reductions and even at a struggling age of maximizing the profits with the recession.

As it explained earlier, the power management software, will be very helpful to any particular company which operates with a number of PCs, even though the technique is very simple as it just about turning

off the unused machines automatically saving a large amount of unnecessary power eating and carbon emission. Thus that will generate a huge advantage to the company in terms of power saving where, it will be a good figure of Return on Investment for such software compared to the returns and investment made for such a technique.

Considering the Sri Lankan companies, it should be noted that the culture of the companies and the mind set of the employees should be dramatically changed before making any changes to the existing IT systems within the companies. Therefore change management tools will be needed to adopt prior to any relevant Green IT adjustments.

Therefore, to step towards the green IT may be critical to any company, according to Jon Bentley, there are five step procedures which could be used by any company in order to apply Green IT and an efficient power management by reducing the servers, machines, and any other IT related equipments.

- Assessment of what the company already has
- Engineers should then begin to understand that how the IT centre is configured
- Estimations of the waste capacity
- What services are the actually needed and provided by the company
- How the architecture can be redesigned more efficiently

5. Conclusion

The most important factor which should be known by Sri Lankan companies is that although they use IT functions and IT techniques into their business operations which gives massive benefits in terms of efficiency and effectiveness, still there is a huge gap between IT culture of global companies and that of Sri Lanka considering the carbon emission generation and power wastage. Therefore the best thing is to be done by Sri Lanka is to adopt some Greener techniques into the IT fields so the efficiency will be marked at a maximum rate in terms of both financial and non financial grounds stepping towards to global trend.

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Underground Rain Water Tanks system to Prevent Kidney Dysfunctions in Rajarata

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1. Introduction

Water is the most precious resource in the planet earth; without it; plants do not grow and people will last only two or three days. People often talk about diminishing the impact of crude oil and it's influences on energy creation in coming in the future. Hence, most of the people do not feel that water is also rapidly becoming a scare resource in some parts of the world. However, due to unplanned developments in human society, water is gradually become a limited resource in the world. Therefore, there is a need to developing strategies and technologies to prevent the every single drop of water for effective use. Since the beginning of human civilization people tried to save the rain water to make use it when there is no rain. Sustainable rainwater storage tanks have been used in several countries like Australia for years and years. Underwater Rain Water Storage system is one of the success stories of sustainable rain water management systems.

Apart from preventing rain water being wasted, there is an emerging requirement of using purified rain water to safeguard people from being effected by toxic water consumption. The natural environmental setting and non-prevented release of toxic chemicals to

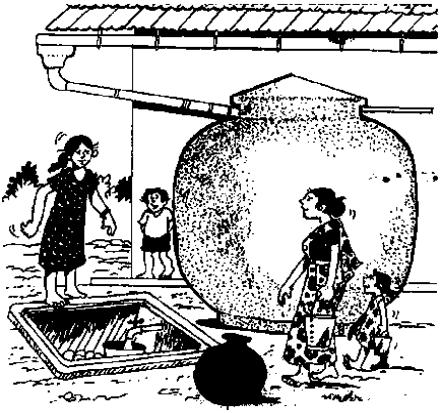
land and water have caused for kidney dysfunction and other deadly diseases.

2. Kidney dysfunctions in Rajarata- Sri Lanka

Even though, a large scale attention is not yet given to the slow death rate of people living in agrarian cities of Sri Lanka due to kidney damages, it has become a serious threat for the survival of people in those areas. People with kidney dysfunction in Rajarata area have outnumbered the patients with kidney dysfunction in rest of the country. According to the recent scientific studies, the toxic water consumption is recognized as one of the major reasons for high rate of kidney damages in certain areas in the world. Rajarata region might be one such area that the drinking water sources have toxic chemicals, which causes kidney damages. There is an unsolved debate going on determining how the toxic chemicals mix with water; however, it has been widely accepted that water is the main cause of the kidney dysfunctions in those areas. Finding the sources of toxic chemicals is important to prevent water sources by being polluted. However, there should be short term concern to provide alternative water sources to prevent people from being effected by kidney dysfunction.

Rajarata region is the heart of Sri Lankan agriculture. There are number of big tanks that collect rain water to prevent water to use for agriculture when there is no rain. Therefore rain water prevention in Rajarata area has been there for long time. However, usage of purified rain water as drinking water has not been very popular. A pilot project of household rain water prevention has been implemented in other parts of the country, but not in Rajarata yet.

3. Sri Lankan Technology of Saving Rain Water

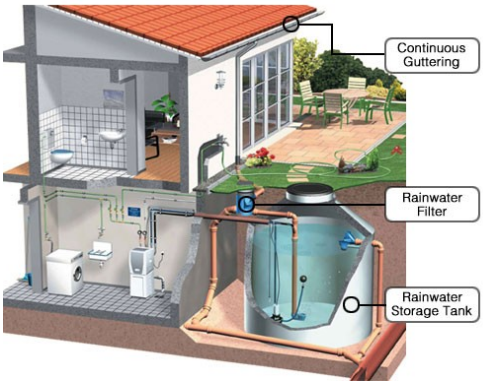


The Sri Lankan Pumpkin Tank and its water draining technique was developed as part of a World Bank sponsored project, Water and Sanitation Program which was implemented in the country between 1995 and 1998. The Community Water Supply and Sanitation Program (CWSSP) covered 3 districts within the country - Badulla, Ratnapura and Matara Districts. Hundreds of these tanks were built in areas where predictable supply schemes, such as piped supplies or ground water supplies, were difficult to provide.

The technology in Pumpkin water tanks is very primitive and uses less technical mechanism to collect and use water. The big pumpkin type water tank has installed on the house yard and water draining pipe connects to the tank. There is a tap at the lower section of the tank, where users can get water out from the tank. Even though this is an effective system of collecting rain water, there are numerous limitations in it. First and the most critical issue is the space that requires to install the tank. People cannot use that area of land instead of allocating it for the water tank. Secondly, water outlet is attached to the tank and people need to take water manually to where they want to use water. Thirdly, there is no opportunity for water purification. Therefore, collected water can only be used for external purposes.

4. Underground Rain Water Tank System

Underground rain water tanks represent a mature technology. Their use goes back many centuries and development has been going on throughout the history. This does not mean, however, that there is no room for improvement of the technology. Modern techniques and materials have great potential to manufacture underground rain water tanks.



Underground Rainwater Tanks are designed to collect water from the roof area and get them down to a tank that is located underground. Rain water coming from the roof connects to a single pipe line and goes through a filter before entering to the tank. Hence, collected water is prevented from unwanted particles. Then the outlet of the water is connected to the pipe line where uses want to use that water. filtered water can be used not only to supply water for toilets, laundry, garden, washing the car, but also to drink and cook after doing further purification. Compared to pumpkin water tank system, underwater tank eliminates all the disadvantages of pumpkin tanks. The underground rain water tank is a contemporary solution for rainwater capturing and rainwater filtering. It's a lightweight 'space saving' underground tank that provides stimulating lugs at top of the tank for ease of maneuverability and installation.

Under Water Tank can be manufactured by concrete or high quality plastic. The tank needs to be extremely durable and highly resistant to furious caused by external pressure created by ground movement. Concrete or high quality plastic also prevents any materials from leakage into the water. They can be installed individually to suit smaller domestic projects or alternatively, a "servant tank" system can easily be specified to allow development of "reservoirs" for much larger domestic and commercial projects.

5. How to Build the URW System

- Firstly should determine the catchment surface. The roof of an existing home is the most suitable surface to use.

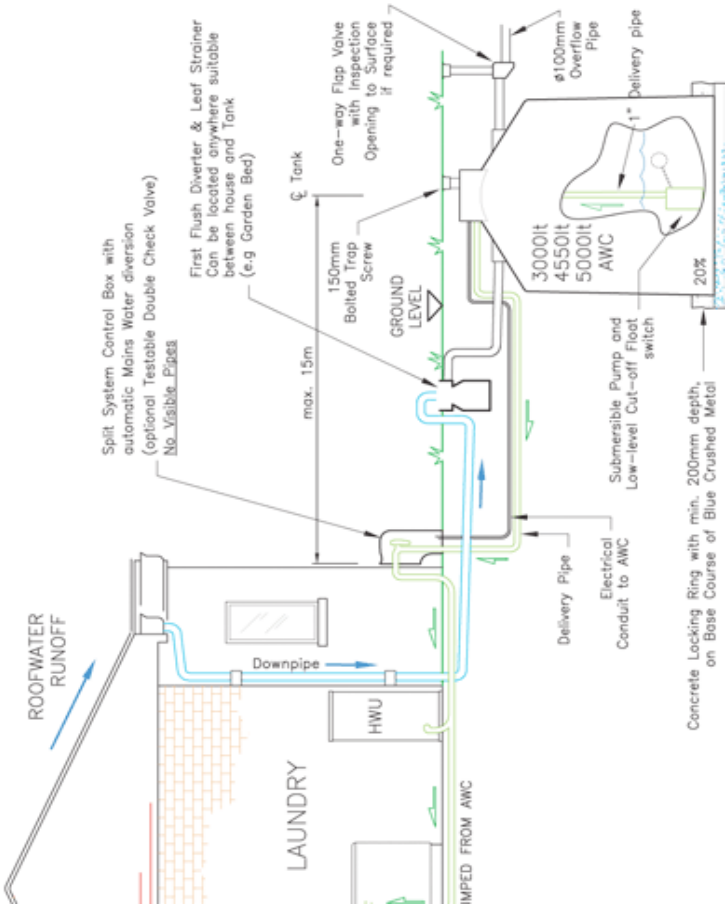
- Attach gutters along the border of the catchment surface to catch run-off water. Use PVC & galvanized steel gutters to ensure that water quality is not affected by contamination in the gutter system.

- Select a location for the storage tank that is at least 50 feet from animal stables or static fields. Cover the storage tank as close to the catchment surface as possible to minimize the need for long lengths of pipes.

- Attach downspouts to the walls of the building using appropriate size fasteners. The downspout tube should run from the gutter to the storage tank. Insert screens and filters at both the downspout and tank levels. Filters and screens prevent debris from entering the storage tank. There is a wide variety of options for filtration.

- Attach an on-demand water pump as close to the tank as possible. As opposed to a standard pressure tank pump system, an on-demand water pump moves water directly from the storage tank.

6. How the Technology Works



Source: http://www.actiontanks.com.

The concrete/plastic construction means the tanks are durable and highly compacted. Their seamless construction also means there is very little chance of leakage or intrusion. They are also much protected and cannot be tampered with by children. The inbuilt filters allow unassisted cleaning. When the first batch of rainwater enters the tank, any dirt, particles, or compounds picked up from the roof are removed, allowing the clean water enter to the main part of the tank. Once the collected water boiled, it is ready for human consumption. With the clever design of these tanks, the addition of more tanks is possible.

7. Conclusion

Clean water is a rare resource in the world. Therefore, everyone needs to make efforts to prevent the available water sources and maximize the usage of rain water. Even though this is the main idea behind the water management projects, there are potential benefits that go beyond the traditional objectives of water management. Underground Water Tanks suggested here are targeted more on the benefit that can give to the innocent people who living by being seriously vulnerable to kidney damages. Cure is needed for the ones who are infected by the toxic chemicals, but what is more important is to prevent rest of the people in Rajarata becoming kidney patients in the future. Underground Rainwater Tanks would provide efficient, effective and feasible solution to prevent people from consuming toxic water while providing opportunities to prevent wastage of rain water.

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"...Most technological improvements in developing countries are at least partially dependent on the diffusion of technology from more advanced countries. Nevertheless, scientific innovation is important in some developing countries, and advanced technologies often need to be adapted to local conditions, which may require further innovation. Technological advances do not need to be extraordinarily complex or reliant on the most sophisticated technology to have important development impacts. In many low-income countries, fairly commonplace technologies are often in short supply because of weak capacities to implement them and relatively simple innovations can have profound effects. Hence, the developing countries with low technological progress need to go through the process of adaptation and adoption of technologies from abroad rather than the creation of new to the-world technologies. It would give them an opportunities to stimulate their awareness and enthusiasm in creating more localized innovations in their countries..."

Global Economic Prospects:
Technology Diffusion in the Developing world 2008
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In search of Stimulative Technologies

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