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SYNDICATE – 04

**SOCIETAL ROLE OF  
PROFESSIONAL ENGINEERS  
TO UPLIFT  
SRI LANKAS ECONOMY**

**FACULTY OF DEFENCE AND STRATEGIC STUDIES  
GENERAL SIR JOHN KOTELAWLA DEFENCE UNIVERSITY**

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**DS COMMENT**

**TITLE PAGE**

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**DECLARATION**

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## **CHAPTER ONE**

### **1.1 INTRODUCTION**

3. Engineering education has made significant progress in strengthening the basic sciences in engineering, including mathematics, chemistry, and physics. Recent trends toward increasing discussion of professionalism in the classroom notwithstanding, topics of professional responsibility (as compared to engineering sciences, and engineering analysis) have received surprisingly little attention in engineering education over the last several decades. In the practice of engineering, professional responsibility should be emphasized on topics such as Safety and welfare of the society, professional ethics, environmental responsibilities.

#### **1.1.1 What is the role of engineer in society?**

4. Engineering is by all means a great profession. It is fascinating watching a figment of the imagination arise with the help of science moving towards a plan on paper. Then it is moving towards realization in stone or metal or even energy. Then it contributes to the standards of living in addition to the comfort of life. It is the engineer's extreme privilege. - Herbert Hoover The engineer is the major figure within the material progress of the world. Engineering is what makes the reality of the potential value of science in order to translate scientific knowledge into tools, energy, resources as well as labor brought into the service of man. In order to make this kind of contribution, it requires imagination to visualize the needs of society and to appreciate the technological as well as the broad social understanding to bring the engineer's vision to reality. All in all, the broad definition focuses on the following key words: material progress of the world, societal needs and social understanding. Engineering applies science to the common aim of life. The major purpose of the engineer is to develop both knowledge and understanding of our universe. The main focus of the engineering is to apply scientific knowledge in order to meet the needs of society. The 21st century is defined by huge challenges that humanity is facing. These are energy as well as food security in addition to scarcity of natural resources as well as climate change. The demand of engineering skill is increasingly higher than ever in order to provide sustainable engineering systems. Fig 1 In above vein diagram we can observe that on the basis of analysis of social needs engineer has to apply his scientific and technical knowledge and creativity.

#### **1.1.2 What is Social Responsibility?**

5. Engineering is not stationary profession. 21st century will be defined by huge challenges now facing humanity. These are energy and food security, competition, scarcity of natural resources and climate change. The demand of engineering skills is likely to be higher than ever before in order to deliver sustainable engineering system, low carbon energy technologies and robust physical infrastructure to protect against geophysical hazards such as sea level rise, extreme meteorological events.

6. If ranking these engineering criteria is given as an exercise to client and engineer then it will be as



7. As per the code of ethics of IEEE, the members of IEEE commits themselves to highest ethical and professional conduct and agree

- a. To accept responsibility in making decisions consistent with safety health and welfare of public and to disclose promptly factors that might endanger the public or environment.
- b. To improves the understanding of technology and it's appropriate applications and potential consequences

8. As for social responsibility, it means a certain commitment of the engineering profession to place both public safety and interest ahead of other considerations. The social responsibilities of engineering are the following:

- a. Ensuring both the safety and well-being of the public;
- b. Ensuring that the funds and resources of society related to technology are properly used;
- c. Individual and organizational concern of the impact of engineers' projects upon society;

9. Commitment of engineering schools to educate future engineers on their social responsibilities; Commitment of engineers in order to both design and develop sustainable technologies;

10. Providing expert pieces of advice to non-experts; Providing care as well as concern about the impact of technology on both nature and environment



### 1.1.2.1 Creating awareness

11. Engineers need to develop broad fundamental understanding of their professional responsibilities. In at least one engineering college, students have developed their own codes for their academic career (36). This experience gives the students a personal involvement with professional codes of conduct necessary in the engineering profession. These students have an opportunity to integrate their "professional code" into their daily work as engineering students. This allows students to internalize their professional responsibilities and to develop a fundamental understanding of their obligations and resulting consequences. Students at other universities and the engineering profession would be well served to learn from the experiences of these students who developed their own code.

12. We suggest that engineers examine and adopt "best practices" in development of rules of professional conduct which encourage engineers to understand and internalize their professional codes. Engineers need to develop broad fundamental understanding of their professional responsibilities. In at least one engineering college, students have developed their own codes of conduct (how they will relate to one another and the college) for their academic career (36). This experience gives the students a personal involvement with professional codes of conduct necessary in the engineering profession. These students have an opportunity to integrate their "professional code" into their daily work as engineering students. This allows students to internalize their professional responsibilities and to develop a fundamental understanding of their obligations and resulting consequences.

13. Students at other universities and the engineering profession would be well served to learn from the experiences of these students who developed their own code. This can be done by developing codes for conduct at company, division, or departmental levels in traditional engineering environments. The healthy debate among engineers (as well as clients and employers) which should naturally arise in the integration and the application of the methodologies will serve to underscore the nature and importance of the role that the engineer has in society (health, safety, and welfare of the public); the role the client has in engineering design (realistic requirements, economics, reliability, maintainability, and other associated topics of quality); the effects of engineering activity on society; and the relationship of society to engineering activities.

14. Engineers have responsibility to think about interaction between technology and society. Engineers are supposed to think about effects of their own actions and creations especially if they affect society.

## **1.2 AIM**

15. The aim of the research is to illustrate the accelerated development of technology and its' impact on Sri Lankan culture.

## **1.3 OBJECTIVES**

16. The objective of this get idea about Societal role of professional engineers to uplift Sri Lankas economy. when we study about culture, we can divide into several aspects such as:

- a. Show how engineers contributed to the national economy in past.
- b. Highways how involved in economy growth.
- c. Building construction impact on economical growth.

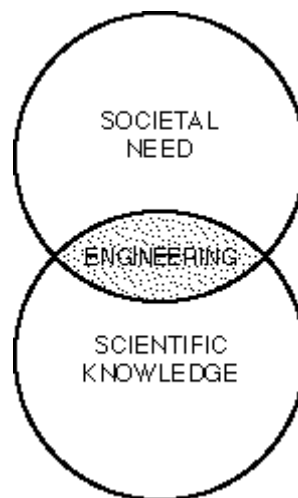
## CHAPTER TWO

### 2.1 SOCIETAL ROLE OF ENGINEERS IN SRI LANKA

#### 2.1.1 Social Responsibility of Engineers

17. Social responsibility of engineering profession is commitment to place public safety and interest ahead of all considerations. It means that engineer takes into account and show due regard for the consequences of their conduct for wellbeing of others as well as the impact of their work on society. This requires the engineer to make determined efforts to discover all the relevant facts concerning the design, development, deployment and all possible outcomes that may affect society positively or negatively. As the Sri Lanka is developing third world country social responsibility of professional engineers of Sri Lanka is very much considerable.

18. Engineering is what makes the reality of the potential value of science in order to translate scientific knowledge into tools, energy, resources as well as labor brought into the service of man. Engineering applies science to the common aim of life. The major purpose of the engineer is to develop both knowledge and understanding of our universe. The main focus of the engineering is to apply scientific knowledge in order to meet the needs of society. The 21st century is defined by huge challenges that humanity is facing. These are energy as well as food security in addition to scarcity of natural resources as well as climate change. The demand of engineering skill is increasingly higher than ever in order to provide sustainable engineering systems.



19. Social responsibilities of engineers vary across different countries and cultures. Sri Lanka owns much different cultural and social values considering other countries, especially from western countries. So we must alter the social responsibility of engineers as suit to our societal needs. Some of the social responsibilities of engineering in Sri Lanka are the following:

- Ensuring both the safety and well-being of the public.
- Ensuring that the funds and resources of society related to technology are properly used.
- Individual and organizational concern of the impact of engineers' projects upon society.
- Commitment of engineering schools to educate future engineers on their social responsibilities.
- Commitment of engineers in order to both design and develop sustainable technologies.
- Providing expert pieces of advice to non-experts.

#### 2.1.2 Human safety

20. Public trust in engineering requires that the profession considers its impacts on human safety. There is widespread consensus in the codes of ethics of engineering professional societies that engineering has a primary duty to protect public safety, health, and welfare. Engineering-related failures or problems that result in injuries or death are often front-page news.

Examples,

- Building collapse at Grandpass, Colombo on 14th February 2018
- Building collapse at Negambo on 17th August 2017
- Building Collapse at Wellawatta, Colombo on 18th May 2017

21. It is of concern that the accumulated impact of frequent news-worthy incidents may over time erode public trust in engineering

#### 2.1.3 Environment and sustainability

22. Engineering codes of ethics include environmental protection among professional social responsibilities. . Environmental considerations in the engineering design process have also been explicitly required. Engineers' social responsibility for environmental protection may originate from different ethical frameworks. From an anthropocentric framework, one may simply understand that preservation of the environment is ultimately self-preservation for human life. Alternatively, from a bio centric perspective one may recognize the intrinsic right to life of all organisms on the planet. The environment and ecology may be viewed to have distinct value, beyond that of maintaining human existence.

#### 2.1.4 Pro bono

23. The idea of pro bono work is that professions should donate some of their technical expertise to individuals or organizations unable to pay for those services. This can be providing services for free or at a reduced rate. While this is common place in professions such a law and medicine, the idea just seems to be starting to grow in engineering and is by no means universal. Institution of Engineers Sri Lanka (IESL) first approved a policy statement on pro bono services in Sri Lanka, encouraging engineers as individuals to provide services to charitable causes and in emergency situations; however, its real purpose appears directed at liability issues and indemnification. As a third world developing country pro bono works are very important to uplift the Sri Lankan Community

Examples,

- Refrigerator Donation for Ratnapura Teaching Hospital in order to initiate PCR test which is important to identify Covid 19 patients by IESL
- Construction of “Taba Seru Vila” and “Siyoth Vila” by Corps of Engineer Sri Lanka according to Green Concept.

24. In engineering education, pro bono work can take the form of service learning or Learning through Service, also termed community engagement. Linkages between community engagement activities among Sri Lankan engineering students and professional social responsibility attitudes were found in a large study.

## **2.2 ENTREPRENEURSHIP OF ENGINEERS**

25. Imagination and advancement are extremely basic and significant for the innovative advancement of a nation. A famous Sri Lankan researcher Kumarathunga Munidasa said a Nation that has no advancement won't emerge. The hypothetical physicist Albert Einstein once said "Creative mind is everything. It is the see of life's coming attractions".

26. Today, the vast majority of the advancements are restricted to the created nations and non-industrial nations including Sri Lanka are still behind in the idea of advancement and advancement of new innovation. With the finish of 30 long periods' of inward clash, Sri Lanka is coordinating at fast monetary and mechanical improvement to turn into the monetary center of South Asia (Hewawasam C. J. 2014)

27. In non-industrial countries, for example, Sri Lanka, business venture is regularly seen as a significant segment in animating monetary development, advancement and seriousness. As in other creating economies, Sri Lankan business visionaries are played with some unmistakable difficulties. "Throughout the following 10 to 15 years we will see a step change increment in advancement and business venture in Sri Lanka. This change will cut across areas and will lead to the making of thousands of new organizations, make a large number of occupations and will bring critical new interest into the economy.

28. Architects are the center piece of the general public and they can participate in the turn of events and progress of any nation. In the century ahead, architects will proceed with association with researchers in the incredible mission of securing new information on the physical and natural universes. Architects can assume a significant part in the following areas for making the economy solid and reasonable.

29. Designing has been and still is the precursor for the turn of events and progress of any nation. In any case, for designing where will you and I be today? To be more exact how is it possible that we would flaunt our antiquated human advancement? We ought to always remember that we are key individuals in building and supporting progress. Architects are makers, architects, fashioners and developers. Our progenitors of ancient ages were the incredible creators and developers, who utilized indigenous techniques to design and construct mother earth. They didn't have the advanced techniques for now, for example, the utilization of program programming. Yet, they did ponder. Specialists have a key task to carry out in the improvement of the framework in any nation in the globe.

30. This key job isn't restricted to power and energy, water flexibly, transportation or the climate. The function of the specialist broadens to lodging, railroads, streets, thruways and extensions, water system, media communications, air terminals and harbors, data innovation and scores of different specializations and sub-segments in that.

31. The part of a designer is sweeping and past the vistas of human reasoning and creative mind. The arising advancements of interchanges and registering have achieved a transformation in regular daily existence during the twenty-first century. The

recognizable cell phone, CD players and fax machines are being joined by computerized broadcast radio and TV which offer more channels and much clearer sound and pictures.

32. Quickly changing world and innovative advancements place high requests on future workers, who are expected to have different conventional abilities and to be creative. Specialists are no exemption. Work markets are not as steady as 10 years back and designs inside organizations are relied upon to be innovatively disapproved just as to make new openings. Meeting the social, monetary and ecological difficulties of expert designing exercises implies that engineers likewise need to see how the business sectors work and creating an incentive for the client, while clinging to moral guidelines.

**CHAPTER THREE**

**ECONOMICAL RESPONSIBILITIES OF ENGINEERS**

**3.1 Contribution of Engineers in their Respective Industries**

33. The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property can be defined as engineering. The one who practices engineering is called an 'engineer'.

- a. What does engineers do?
  - (1) Design create
  - (2) Explore
  - (3) Innovate
- b. Major roles of engineers in the society
  - (1) Technical
  - (2) Social
  - (3) Economical

34. Economics is the human science which studies the relationship between scarce resources and their various uses which compete for these resources. The economic development process supposes that the legal and institutional adjustments are made to give incentives for innovation and for investments so as to develop an efficient production and distribution for goods and services. Economic development is a sustainable increase in living standards that implies increased per capita income, better education and health as well as environmental protection.

- a. Economic activities
  - (1) Primary sector
  - (2) Secondary sector
  - (3) Tertiary sector



35. Primary sector; Simply speaking primary sector refers to that sector of the economy which uses natural resource to produce goods. Natural factors play crucial role in the production process. Agriculture and allied activities like mining, fishery, forestry, diary and poultry are included in this sector. Secondary sector; Natural factors play crucial role in the production process. Agriculture and allied activities like mining, fishery, forestry, diary and poultry are included in this sector. The sector which transforms one physical good into another is called secondary sector. The manufacturing, electricity, gas, water supply etc. are included in this sector. Tertiary sector; The service sector of the economy is called tertiary sector. Services of various kinds like education, health, banking, insurance, trade and transport are included in this sector. In advanced countries, the contribution of tertiary sector to national income is the highest. Economic development

- a. Quality Education
- b. Clean and efficient energy
- c. Sophisticated infrastructure
- d. Improved social Amenities
- e. Increasing phase in GDP per capita
- f. Ability of self-production

36. The engineering profession makes important contributions to the economy, both from the direct addition to economic output from the work they do, and the contribution of the sectors in which they work. One can also consider the long run return to the economy of improvements in physical infrastructure, in which engineers have played a vital role, and the contributions engineers make to the knowledge, economy and to sustainability.

The role of engineers in national economic development

- a. Education
- b. .Production
- c. Construction
- d. Information and telecommunication
- e. Foreign exchange
- f. Infrastructure
- g. Sustainable energy

## CHAPTER 04

### EVOLUTION OF ENGINEERS' CONTRIBUTION

#### **4.1 How Engineers Contributed to the Economy in the Past**

37. During the last few years, Sri Lankan engineers have made contributions towards the country's development work such as in highway and expressway constructions, constructing and maintaining bridges, construction work in the Colombo Port, Bandaranaike International Airport, hydropower projects, water supply projects, monorail system in Colombo, construction of hospitals and large building projects among others.

38. Since the third century BC, and over the years, Sri Lankan engineers have been building Stupas which is built in solid brick structures and have grown in size to become some of the largest brick structures in the world. Jethavanaya stupa, built during the third century AD, reached a height of 122 m, making it the third tallest structure in the world at that time giving a name and famous to Sri Lanka not forgetting attraction of tourist which provided income hence increase in economy.

39. Building construction was a great engineering in ancient Sri Lanka. When we consider about pagodas, they have been built very strongly, that means they have used suitable height according to area of pagoda. While constructing these megastructures, the ancient builders of Sri Lanka have shown some remarkable engineering innovations and skills far ahead of their times. This has been a great achievement by Sri Lankan ancient engineer

40. In addition, aqueduct lines that start from lakes carried two hundred million gallons of water into whole Rajarata area. This science of the aqueducts was use very small-scattered slop changes. Because of gravity, the water would flow downward all the way to whole area from sources. Stones were used to change way of aqueduct lines

#### **4.2 How Engineers Contributes in Sri Lanka Today?**

41. Engineers solve problems where some solutions they bring are elegant and some are inspired, and they come up with high quality designs that apply appropriate technology to solve the problems at hand. The following are the ways engineers are contributing to the today's Sri Lanka: Engineering solutions are improving the quality of the health care systems through new technologies to reach people who live in remote locations where there is lack of health care facilities. Important potential contribution of Engineers to the health sector is to provide infrastructure and technological support

to make the health system accessible to all population, particularly to the marginalized population.

42. Contribution of Engineers are also involving in introducing innovative technologies for improving public health at the community level and advancing medical facilities available at different health care systems from primary to tertiary health care facilities.

43. Engineering combines science and mathematics to find solutions to real world's problems, thereby improving the quality of life of countless people. Engineers from various disciplines play a critical role in the on-going development initiatives, whether it is in the development of infrastructure, utilities, industry or services. Their contribution is essential in the research and development, planning, and execution of most projects.

44. Engineers also have an important role to play in the formulation of broader development strategies and even in matters concerning public policy. Because of this great responsibility, engineers must work hard and carry out work of the highest quality so that our society will benefit.

45. In military, there are corps who provides combat engineering, construction and other technical support to the Sri Lankan Army and civil authorities. The corps' key roles are mobility and counter mobility. That is providing mobility to friendly forces while denying movement to enemy forces. These engineers are able to conduct tasks including penetrating minefields, locating and disarming booby traps, purifying water and building roads and bridges to maintain lines of communications.

#### 4.2.1 Vega EVX

46. A high-powered, electric 'Supercar' has just been rolled out on to the world stage by an innovative Sri Lankan company. The Vega EVX high-end luxury sports car was unveiled at the International Motor Show 2020 in Geneva, Switzerland.

47. The all-electric vehicle is notable as being among the world's first electricity powered sports cars with high performance luxury features aimed at the global affluent market sector. Manufacturer Vega Innovations, a subsidiary of the emergent Sri Lankan-led multinational CodeGen International, has successfully pooled some top-level Sri Lankan technical expertise in designing and building this very first all-electric luxury car of South Asia.



48. Even with one of the world's largest automobile industries in India, next door, it was little Sri Lanka's expertise and entrepreneurship that saw the launch of the Vega EVX at the prestigious global auto industry event in Geneva. Only

49. recently, Indian automobile industrialists were admitting at an Indian motor show that market dynamics were yet inhibiting them from moving rapidly into the production of full-electric vehicles. Considering that existing carmakers such as Porsche, VW, Mercedes and BMW/MINI are just moving into electric vehicles, this is indeed a great achievement for a Sri Lankan company.

50. Even as we wish our new car producer all success on the world market, we must look at the situation within the country for the

51. expansion and use of electricity-based energy in all aspects of economic and social life. After all, it is all very well to produce purely

#### 4.2.2 Lotus Tower

52. Lotus Tower is a multifunctional communication tower currently being built in Colombo, Sri Lanka. Lotus Tower's main revenue sources will be tourism and antenna leasing. It will function as a radio and television broadcasting antenna ISDB-T and proposed DVB-T2 support structure for 50 television services, 35 FM Radio Stations and 20 telecommunication service providers, and will house a variety of tourist attractions.



53. The tower has four entrances, with two being used as VIP (distinguished guests and state leaders) entrances. A telecommunications museum and restaurant are located on the ground floor. The tower podium consists of 6 floors. The first floor of the podium will accommodate a museum and two exhibition halls. The second floor will be utilized for several conference halls with seating space in excess of 500 people. Restaurants, supermarkets, and food courts will be situated on the third floor. A 1000-seat auditorium will be located on the fourth floor, which will also be used as a ballroom. The fifth floor will include luxury hotel rooms, large ballrooms, and the seventh floor will host an observation gallery. The landscaping is planned in the form of a large water park.

### 4.2.3 HIGHWAYS IN SRI LANKA

54. After the end of a long-prevalled war which had a significant negative impact on the progression of its economy, Sri Lanka is now faced with newer opportunities for the betterment of its economy. As there was rapid increase in traffic volume during the past decade there had been a shortage of capacity to meet this demand. From the preliminary studies carried out to meet this demand it has been realized that rehabilitation and widening of existing roads to cope up with future traffic needs at a meaningful level of service is a difficult task without large scale acquisition and demolition of buildings and relocating service utilities. Therefore with the intention of developing and upgrading the transportation systems; Sri Lankan government has come up with major proposals such as four major expressways for its road network as indicated by Sri Lanka.

55. There are three major expressway projects have already been completed.

- a. Southern Highway
- b. Outer Circular Highway
- c. Colombo – Katunayaka Highway

#### 4.2.3.1. Southern Highway – E01

56. The first ever highway in Sri Lanka, the dual carriageway E01, runs from the Colombo suburb of Kottawa to Hambantota, previously it was up to only Matara Godama, but extension of the highway has been completed last year. The route to Matara, which is now connected to the capital by a journey of just two hours, it has reduced the travelling time and freight time between south coast and the capital. This highway network is planned to extend to Batticaloa in the future.

57. Economical value to Sri Lanka

- Reduce traffic congestion on Colombo-Matara Road, and reduce delay costs, fuel costs there by contributing to national economy.
- Attract private sector investors and thereby contribute to expand the job market
- Development of fisheries, agriculture, industries in the region.
- Expand tourism presently confined to the coastal belt, along Colombo-Galle-Matara.
- Development of Galle port.
- Development of the towns along to 11 interchanges as Economic Centers

#### **4.2.3.2 Outer Circular Highway - E02**

58. The Outer Circular Highway (OCH) is located in the Colombo Metropolitan Region and passes through two administrative districts, namely Colombo and Gampaha. This highway runs around 20 km away from the City centre of Colombo, connecting radial routes and has a total length of 18.9 km. The northern end of the highway is located at Kadawatha on Colombo-Kandy (A001) road and the southern end is located at Kottawa on Colombo-Ratnapura-Wellawaya-Batticaloa (A004) road where Southern Expressway meets OCH

59. Economical value to Sri Lanka

- a. To encourage foreign investors by reducing travel time by improving infrastructure facilities.
- b. To minimise environmental impacts created by burning of fuel due to traffic congestion.
- c. To encourage the development of current or future growth centres by providing connections in between.
- d. Quick development of interchange areas will increase property value and creation of new employment opportunities.

#### **4.2.3.3 Katunayake Expressway - E03**

60. Katunayake Expressway is the third link of the Expressway network planned for the country. It is linking the Sri Lankan capital Colombo with Bandaranaike International Airport, Katunayake and Negombo city. Katunayake Expressway runs from New Kelani Bridge to Katunayake (25.8 km). The Expressway has 42 bridges and 88 culverts including a 480 metre long viaduct at Hunupitiya and a 800 metre viaduct at Katunayake.

- a. Fast access between Bandaranaike International Air Port to Colombo City.
- b. Reduce traffic congestion on Negambo-Colombo Road, and reduce delay costs, fuel costs there by contributing to national economy.
- c. Attract international investors and there by contributing to expand the job market
- d. Development of fisheries, agriculture, industries in the region.
- e. Expand tourism presently confined to the coastal belt, along Katunayake-Colombo.
- f. Development of the towns belong to 4 interchanges as Economic Centers

## **4.2.4 Highways impact on economy**

### 4.2.4.1 Vehicle operating cost savings:

61. Vehicle operating costs (VOC) are the costs associated with the running of a motor vehicle such as fuel, oil, tires, repair and maintenance and depreciation costs. Smooth vehicle running conditions in CEP, against the base case situation of existing road network, was assumed. CEP operations reduce the unit VOC offering vehicle operating cost savings to users as main economic benefit.

### 4.2.4.2 Travel and freight time savings:

62. Savings in travel time is a primary economic benefit sought from undertaking transport sector projects. These savings are enjoyed by passengers as well as freight consignees. A main benefit predicted by traffic models for users of CEP is travel and freight time savings.

### 4.2.4.3 Savings of accident costs:

63. Savings of Accident Costs The accident rates reduce on expressways compared to normal highway roads (A class). The fatal accident rates for highways is 0.12 accidents/ mn veh-km and for expressways is 0.05 accidents/mn veh-km. The economic cost of a fatal accidents represent the majority of the total economic cost of accidents in Sri Lanka, furthermore there are no present estimates for accident rate for other types of accidents (damage only, grievous, non-grievous) for expressways in Sri lanka, therefore consideration of reduction of fatal accidents is deemed adequate for the purpose of this analysis. The economic value of a fatal accident is given as Rs. 1,51 mn (199 Rs.) in a report published by Department of National Planning, Sri Lanka (2000). The adjusted value to represent the current value is Rs. 5.75 mn.

## **4.3 How Engineers can Involve in Future Contributions**

64. This is a time period that the Sri Lankan economy is moving to a different direction. After 30 years of cruel civil conflict our country today is one of the most stable and peaceful countries in the world.

65. As a country we have faced many conflicts during the past few years such as tsunami, civil war, and Sunday Easter attack. And now we are facing the Covid-19. As Sri Lanka gained a widespread and far reaching economic development trust, we all have a responsibility work together with dedication and commitment to drive the nations development. In here the role of an engineer is very important.



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66. Engineers play a critical role in the development of infrastructure, utilities, industry or services. they are prioritizing to build a thriving Economy. The role of an engineer became one of the major beneficiaries of country's rapid economic development as the country rushed to make up for many years of neglect and ruin. So in here their contribution is essential in the research and development, planning, and execution of most projects in the future.

67. The acquisition of advanced technology is the crucial factor that determines whether Sri Lanka could overcome all these challenges and gain a high income within the next two decades.

68. Since engineers are often opinion leaders in their sector and also in many sector, they also need to contribute to the change in public attitudes that Sri Lanka needs. It is only then we will be able to change established patterns of behavior to inspire the development that Sri Lanka seek.

69. In this context; engineers have an important leadership role to play in our society. Leadership is essential at all levels and in all sectors of the country.

70. Interest in engineering for growth has grown within engineering communities in the US and around the world in recent years. Many initiatives for engineering-for-development share troubling assumptions about the role of technology in community development. In both cases, questions of technological functionality appear to mask imbalances in social power, leading to projects that unintentionally arise.



71. Interest in 'tech for growth' has surged in North America and around the world in recent years. Dozens of educational engineering institutions fund projects overseas for growth. Non-governmental organizations (NGOs) have also recently arisen, highlighting the role of engineering in development. These efforts face the additional objective of offering cross-cultural and other educational opportunities for participants.

#### 4.3.1 Products For Engineering

72. Sri Lanka has a long tradition of delivering feats from reservoirs that cross the horizon and stupas that kiss the sky of engineering genius. Today, by merging Sri Lankan flair for creativity with modern technology and expertise in engineering products and services, the country's engineering industry is a continuation of our heritage to the future that moves civilization forward.

73. Sri Lanka's innovation industry stands on the shoulders of global and local innovators and engineers to enter the future, whether we are designing electronic technologies to push digitization forward; electrical equipment for green energy generation or creative new methods to make travel and transport more sustainable and secure;

74. Sri Lanka's manufacturing industry delivers a variety of high-quality electrical and mechanical, light engineering, aerospace, aviation, and maritime engineering goods to the global markets.

75. The foundry industry is an important feeder industry for the engineering materials market, providing machines, equipment and instruments with components and spare parts and specializing in tea, rubber, oil and fiber machinery parts. A wide variety of specifically exportable finish metal items are also provided, in addition to the availability of critical parts for marine engineering and turbine bearings. The manufacturing capacities of grey iron casting, ductile iron casting, Aluminum, brass and steel casting are available from foundries in service in Sri Lanka. Specialties in these sectors are work manufacturing and medium scale castings.

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**CHAPTER 05**

**CONCLUSION**

77. Engineers in Sri Lanka have taken a huge part of development of Sri Lanka. They have put their highest effort to uplift the economy of the Sri Lanka in this era as previous eras. Many inventions and development projects they have done and carried out. In every engineering field (Electrical, Electronic, Mechanical, Biomedical and Mechatronic engineering) there is a technological development, of the knowledge and the equipment.

78. Engineers have well learned and experienced of every related thing around them. Attracting talented young people to engineering careers and developing educational systems that ensure a firm grasp of fundamentals while promoting creativity and a spirit of inquiry. Maintaining the skill base of the engineering work force by providing access to learning opportunities throughout the working life of engineers. Developing new approaches to engineering education that make the best use of the Internet and other information technologies. Ensuring that educational systems provide the two countries with sufficient capability for global engineering by transmitting to engineers the skills and experience needed to perform effectively in international collaboration.

79. In here we were considered about past, present and future engineer behaviors and what they have done to uplift Sri Lankan economy and how they will face future experiences and what will they do for uplift Sri Lankan economy.

80. In the past our ancient engineers have done so many unbelievable designs, inventions, and town planning for example Lovamahapaya, Mirisawetiya, Sorabora Wewa, and other tanks. In the past, irrigation technology was in very high level. It was reason to be a self-sufficient country at the time, we exported rice to other countries. Those days engineering technology helped the growth of the country.

81. In King Rawanas' era 'Dandumonaraya' was an incredible invention. This not a factor to growth of the country but it is factor to show the standard of the level of the engineering technology.

82. Today we can see so many things what have done by engineers building designs, and town planning. Vega car, Lotus tower, reopening of paper factory and many other things. Considering to past era engineers we must admire their practical knowledge. Their skill is magnificent. With few resources they have managed to do so many things. There are some designs that people can't still find the way of how were they designed.

83. Finally, industries and the inventions of engineers have contributed a lot to Sri Lanka's economy. Their help is much important to Sri Lanka as a third world country.

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