DEVELOPMENT SUPPORTIVE NOVEL TRENDS AND PRACTICES FOR CONSTRUCTION SECTOR

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ABSTRACT

The rapid development of the technology paved the way towards the new trends and innovations in each and every industry. This is a universal truth which has no any exceptions to the construction industry which faces rapid changes frequently while being one of the major industries of a country that contribute to the living standard of the citizens and to the development of the country.

Sri Lanka being one of the countries with booming economies, it is inevitable to respond to the innovations in world construction industry and there are some important new trends to the development of the industry. Therefore, this research is carried out to address the research gap to identify the important new trends of the Sri Lankan construction industry.

In order to proceed with the research, quantitative research approach was adopted through a questionnaire survey with 90 respondents including clients, contractors and consultants 30 from each. Data were analyzed statistically and were ranked based on the mean value. Out of the nine identified new trends, waste management, sustainability and green building concept and risk management has been identifies as the most important developments over information technology related developments while advanced technological developments were considered with lesser practical applicable value within the Sri Lankan context. Hence, as per the research, it is required to conduct further research studies to acknowledge the time, cost and other benefits can be adopted through facilitating identified innovation and new trends while giving the priority to the high ranked trends identified through this research.

Keywords: *Construction industry; Development; Innovation; New trends; Sri Lanka.*

1. INTRODUCTION

Conceptual changes as well as the technical changes are normally happening in the construction industry. Both developed or developing countries have to face some problems and challenges in the process of adapting and reacting to the changes. As Ofori (2000) mentioned, the construction industry faces to problems and challenges everywhere. But in the developing countries those problems and challenges are more than developed countries and also those problems and challenges become greater in extent and severity with the time. When consider the Sri Lankan construction industry, very limited work had been done, to study the development of the Construction Industry. Nevertheless, it was felt that much has to be done to improve on it being a sector contributing to Gross Domestic Production (GDP) around 9% (ICTAD, 2008). As Paulsen (2008) mentioned, during the industrial revolution, the construction industry had changed at a rapid pace because new advancements in technologies, new tools and new building products had come available to a hungry construction industry faster than ever before. According to Huovila and Koskela (1998), the building industry had to adapt to the new and emerging construction markets which have environmental and social dimensions such as green building concept and waste management. Apart from these concepts, the trends like Building Information Modelling (BIM), Cost Information Management System (CIMS), e-procurement, e-tendering, lean concept, waste management and risk management are also still not implemented to construction industry in a considerable scale (ICTAD, 2008). Compared to the developed countries, it shows a shortage in implementing new trends to the construction industry in developing countries. Similar to the many other developing countries, Sri Lankan construction industry faces numerous challenges when trying to move along with rapidly changing global construction economy. Although it

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is much in need to get the quick adaptation and insertion of novel trends emerging in the world industry, it is rare to be seen the results or progress within Sri Lankan context at the present. The reasons for those failures are challenging to the development of the construction industry in the country and it cause to dropdown the economic development of whole country at the macro level.

2. AIM AND OBJECTIVES

The aim of this research is to identify and promote adoption of development prone novel trends and practices to construction sector. In order to achieve the aim, the objectives were set as; identification of the current situation of development of Sri Lankan construction industry, identification of the new trends in construction industry and to explore the current level of adoption of new trends into the Sri Lankan construction industry.

3. LITERATURE REVIEW

3.1. NEW TRENDS AND PRACTICES IN CONSTRUCTION INDUSTRY

Construction industry is one of the rapidly developing industries in the world. According to the Economy Watch (2010), Construction Industry is one of the biggest and most booming industries in the whole world and this industry is also a potential employment generator and provides work to almost seven percent of the total employed person in the whole world. Therefore the new trends and the new practices are continuously adding to the construction industry. The most recent new trends and practices which have been identified through the literature review are given in the above Table 1 with the respective references.

Table 1: New Trends and Practices in Construction

Trends/Practices	References
Green Building Concept	Kibert, (2013); Cohen (2010); Abidin (2009); Jones, Shan and Goodrum (2010); Ahn and Pearce (2007)
Risk management	Kangari (1988); Akintoye and Macleod (1997); Carr and Tah (2001); Wang, Dulaimi, and Aquria (2004); Bosher, Dainty, Carrillo, Glass and Price (2007)
Waste management	Pongrácz, (2004); Kumara and Wijitha (2011), Shen *et al*., (2004); Kofoworola and Gheewala (2009); Tam (2008)
Cost Information Management System (CIMS)	Laudon and Laudon (1991); Albert *et al*. (1990), Wong,A.K.D., (2005); Jun-xia, (2007)
E-procurement	Eadie *et al*. (2007); Vitkauskaite and Gatautis (2008); Eadie et al. (2010); Hardy and Williams (2008)
E- Tendering	Weippert (2003); Tindsley and Stephenson (2008); RICS (2005); Kajewski and Weippert (2004)
Building Information Modelling (BIM)	Bacharach (2009); Smith (2011); Economy Watch (2010); Gu and London (2010)
Nanotechnology	Wang (n.d.); Bartos *et al*. (2009); Mann (2006); Rana *et al*. (2009)
Robotic Engineering	So and Chan (2002); Elattar (2008); Balaguer and Abderrahim (2008)

3.2. ADOPTION OF NEW TRENDS AND PRACTICES TO SRI LANKAN CONSTRUCTION INDUSTRY

Sri Lanka is yet a developing country. Therefore adapting all the new trends and practices in the world construction industry is not practical for a country like Sri Lanka. Yet the requirements for such

changes are highlighted in the literature. As an example, Jayawardene (2011) said to the Lanka Business Report that it has to realize that Sri Lanka have not come up with indigenous technologies, sustainable technologies, materials, building components, systems and green technologies and all which is in fact the need of the hour. But it could be observed that some new trends are adopted up to a certain degree into Sri Lankan construction industry. The new concepts like green building construction, risk management and waste management have adapted to the construction industries in the developed countries. But in the Sri Lankan construction industry, it can be seen a less use of these trends. When considering the new trends like CIMS, e-procurement, e-tendering, BIM, nanotechnology and robotic engineering, those trends are not adapted to the construction industries even in the developed countries very well and almost zero percent of adoption to the Sri Lankan construction industry. As Wong *et al*. (2009) revealed, BIM has being increasingly used as an emerging technology in the developed construction industries such as United State, Norway, Finland, Denmark and Singapore and couldn't be seen a implementation in other developing countries in Asia. Confirming the facts, Suh (2010) emphasized that the rates of innovation differ a great deal among nations and even between regions within a nation.

4. REASONS FOR NON ADOPTION OF NEW TRENDS AND PRACTICES TO SRI LANKAN CONSTRUCTION INDUSTRY

There are several challenges facing the construction industry when trying to move ahead and adopting of new trends and practices. The main challenges for implementation of those above discussed new trends and practices are given in the Table 2 with the respective references.

Table 2: Challenges for Innovation in Construction Sector

Challenges for implementation	References
Financing capability	Vorasubin and Chareonngam (2007)
Limited credit facilities and high interest rates	Evans (2011)
Misunderstandings	Karunaratne (2010); Pan *et al*. (2007)
Lack of professionals and expertise	Lyons and Skitmore (2004)
Narrow profit margin by contractors	Mincks (2011)
Poor documentation process	Downey (2006)
Poor communication	Emmitt and Gorse (2003);
Low level of usage of Information Technology (IT)	Pamulu and Bhuta (2004)
In-experience	Akintoye and Macleod (1997)
Low level of technology usage	Ashby (2009)
Less government co-operation	Pamulu and Bhuta (2004);
Lack of high technical construction equipment	Lall (1990)
Lack of usage of innovative building materials	Lall (1990)
Lack of skilled workers	Tucker *et al*. (1999)
Lack of Opportunities for Research and Development	Ilter (2007)
Less Support from Institutional Organisations	Bondin (2008)

5. SUGGESTIONS TO OVERCOME THE CHALLENGES IN SRI LANKAN CONSTRUCTION INDUSTRY DEVELOPMENT

It should have to have a certain or likely solution prevailing for any kind of a problem. Therefore it is necessary to take relevant actions to overcome those challenges to achieve the development of construction industry in Sri Lanka through responding to the innovations effectively. The Table 3 presents such suggestions which were identified through the literature review.

Table 3: Suggestions to Improve Adoption of New Trends and Practices into Construction

Suggestion	References
Conduct training programs to construction related professionals.	Edum- Fotwe and McCaffer (2000)
Conduct seminars regarding the benefits in adopting innovation	Ofori (2000)
Conduct workshops, debates etc among undergraduates in the field of construction.	Bondin (2008)
Identify the negative myths regarding usage of innovation in construction.	Pan *et al.* (2007)
Conduct seminars and awareness programs focusing on the identified myths and their validity.	Mansfeild (1988)
Conduct research studies to establish that innovation shall lead to time and cost reduction in construction.	Dulaimi *et al.* (2002)
Get the professional bodies such as IESL, IQSSL etc to identify innovation as a requirement in construction industry.	Blayse and Manley (2004)
Instruct consultancy firms to promote innovation in the construction industry.	Nam and Tatum (1997)
Conduct seminars to major clients to make them aware of the potential benefits on innovation in construction.	Bougrain (2006)
Publish articles on construction magazines on the success stories of using innovation in construction.	Manley (2004)
Introduce National Awards to contractors to award when innovative techniques are implemented.	Pan *et al.* (2007)
Provide concessions and tax benefits to the contractors who are engaged in innovation.	Manley (2008)
Give a considerable priority to the contractors who are involved in innovation in government tender procedure.	Liu*et al.*(2004)
Include clauses regarding innovation in conditions of contracts such as SBD.	Anand (2008)
Introduce criteria in ICTAD registration of contractors regarding innovation.	Anand (2008)
Allocate funds to carry out research studies on innovation.	Ilter (2007)
Provide financial assistance to a certain extent if innovation is considered in projects.	Gollin (1967)
Provide insurance covers specifically for the contractors engaged in innovation.	Anand (2008)
Develop a panel of professionals who are well experienced in the industry to assist contractors who are implementing innovation.	Liu*et al.*(2004)
Provide support and assistance through online solutions through a panel of professionals.	Ilter (2007)
Provide on the job training in foreign countries where innovation is severely practiced.	Gollin (1967)

6. RESEARCH METHOD

Theoretical background of the issue was examined through referring to journals, research papers, conference proceedings, government reports, books, online papers and web sites under the literature survey to define the research gap as the initial step of the research. There are various research approaches such as quantitative research, qualitative research and participatory research (Senarathna, 2012). Here the researchers have followed the quantitative approach. A common way of conducting quantitative research is using a survey. Surveys usually involve filling in of a questionnaire and the usefulness of a survey is that the information obtained is standardized as each respondent, who fills out the questionnaire is answering the exact same questions. Research techniques comprise of data collection methods and data analysis methods. Research methods are concerned with the techniques which are available and those which are actually employed in research project (Fellows and Liu, 2003). A variety of data collection methods can be used in researches. They may include interviews, questionnaires, document surveys, observations, participation and simulation. A well designed questionnaire was used as the research tool being a research falling into the positivist paradigm in research philosophy. Through the survey data were gathered from the industry to rank the new trends

in construction industry in accordance with the importance and adoption. Respondents represented the all three main stakeholder categories of the industry namely, contractors, clients and the consultants. There were thirty respondents from each category within the questionnaire survey sample. Researchers used statistical technique to find the mean of the scores collected through the questionnaires survey to rank the importance of new trends in construction industry and level of adoption of those trends in Sri Lankan construction industry practice.

7. RESEARCH ANALYSIS AND FINDINGS

The analysis of data was done in two directions as to rank the importance of new trends and level of adoption of new trends in the Sri Lankan construction industry.

Survey respondents have assigned a score to the each factor identified in the literature chapter through the provided questionnaire. Factors were ranked based on the mean value calculation of the received ranks.

7.1. IMPORTANCE OF THE NEW TRENDS TO THE SRI LANKAN CONSTRUCTION INDUSTRY

The results of the statistical analysis are presented in the Table 4 below.

Table 4: Level of Importance of the New Trend to the Sri Lankan Construction Industry

New Trends	Mean	Rank
Waste Management	4.5778	1
Green Building Concept	4.3444	2
Risk Management	4.0667	3
Cost Information Management System (CIMS)	3.8444	4
e- Procurement	3.2667	5
e- Tendering	3.2556	6
Building Information Modelling (BIM)	2.5222	7
Nanotechnology	2.4667	8
Robotic Engineering	1.9333	9

According to the Table 4, respondents of the survey have identified the most important new trend to Sri Lankan construction industry as waste management. Through proper waste management systems, it could be able to minimize the waste generated through construction industry practices and also waste can be recycled within the construction process itself. Therefore it will lead to minimize the cost of the construction projects. Further, through a proper waste management system it can minimize the overhead cost of a construction project. As a result of that a proper waste management system would become a requirement of the Sri Lankan construction industry. The green building concept has been identified as another important new trend. It has become the second important new trend to the Sri Lankan construction industry as per the collected scores in the questioner survey. Due to the energy efficiency methods and the environmental friendly construction methods of the green building concept, it is considered as an important new trend to the Sri Lankan construction industry having energy crisis as a major challenge for Sri Lanka at present. Construction industry is an important contributor to the economy of the country that has high level of invested money on the construction projects. Therefore it is necessary to have a proper system to minimize the risk of the projects due to the radiant varying nature of the industry. Therefore the risk management is also identified as an important new trend for the Sri Lankan construction industry. Cost information is an important aspect in construction practice. Therefore a system like CIMS is very important thing for the construction industry development. But due to the frequent changes of the cost information, it is difficult to develop such system relevant to the Sri Lankan construction industry and therefore CIMS have achieved the

fourth place in the rankings. E-procurement and the e-tendering are having the fifth and sixth rankings according to the collected scores in the questioner survey. The importance of those trends is minimizing the documentation cost and increasing the construction project speed in the pre contract stage. Sri Lanka is rich with its human resources therefore the cost for the professional services and the labor is comparatively less in local; context. Therefore BIM and robotic engineering are identified as with a less importance to the development of Sri Lankan construction industry as the trends replace the human participation. Nanotechnology is also not identified as an important new trend to the Sri Lankan construction industry development by the respondents.

7.2. LEVEL OF ADOPTION OF THE NEW TREND INTO THE SRI LANKAN CONSTRUCTION INDUSTRY

The level of adoption of the new trends in the Sri Lankan context is presented with the ranks obtained, according to the mean of collected scores from the questioner survey. The results can be presented through the table below.

New Trends	Mean	Rank
Risk Management	3.2889	1
Waste Management	3.2444	2
Green Building Concept	3.1667	3
Cost Information Management System (CIMS)	2.7556	4
e- Procurement	2.0778	5
e- Tendering	2.0556	6
Building Information Modelling (BIM)	1.8000	7
Nanotechnology	1.4222	8
Robotic Engineering	1.3000	9

Table 5: Level of Adoption of the New Trend to the Sri Lankan Construction Industry

According to the Table 5, the risk management has identified as the most adopted new trend out of the above all new trends in Sri Lankan construction industry. But the mean level of adoption of the risk management has calculated as 3.2444. It shows that, although the risk management has identified as the rank number one, it even not adapted to the Sri Lankan industry to a greater extent. Shortage of proper risk identifying and management system apart from the various kind of insurance coverage to minimize the risks of the Sri Lankan construction industry might be the cause to the low level of mean adopted level to the risk management. Although the waste management has been used for a considerable time period, the expertise believe that it is necessary a further improvement in the waste management system and due to that reason waste management is also having a less mean adoption level. However waste management has occupied the second place of the rankings among the considered new trends. Green building concept has already adapted to few construction projects successfully in Sri Lankan construction industry. Therefore it has considered as an adapted new trend to Sri Lanka. But due to the less number of projects that has implemented the green building concept, it is expected a more developed level of implementation of green building concept into the construction industry and therefore it is also not identified as a well adapted new trend to the Sri Lankan construction industry. Although there are various kinds of cost databases maintained to use in the future projects by the construction companies, due to the frequent changes of cost information it is difficult to develop a proper CIMS for Sri Lankan construction industry. Further, the new trends like e- procurement and e- tendering are also rarely use in the construction industry. Therefore the respondents have identified e – related trends as less adapted new trends to the construction industry of Sri Lanka. At the same time BIM, nanotechnology and the robotic engineering are identified as very rarely adapted new trends in Sri Lankan context. But due to the mean level of the adoption of all new

trends is at a lower level it proves that there is not a sufficient adoption of those trends to the Sri Lankan construction industry.

7.3. FACTORS WHICH INFLUENCE FOR SRI LANKAN CONSTRUCTION INDUSTRY DEVELOPMENT

Respondents' have assigned a score for each factor according to the level of negative influence it gives in development of the Sri Lankan construction industry. The mean level of influence of each factor according to all the collected scores has calculated and was used to rank the influence of each factor in the analysis. The results are given in the table as below.

Table 6: Factors Influenced to the Sri Lankan Construction Industry Development

Challenge	Mean	Rank
Financing capability	4.6444	1
Limited credit facilities	4.3556	2
High interest rates	4.2778	3
Lack of opportunities for research and development	4.1667	4
Less support from Institutional organisations	3.7889	5
Less government co-operation	3.7000	6
Low level of technology usage	3.6111	7
Lack of usage of innovative building materials	3.4889	8
Inexperience	3.4667	9
Narrow profit margin by contractors	3.3889	10
Lack of high technical construction equipment	3.3111	11
Lack of professionals and expertise	3.2556	12
Lack of skilled workers	3.2333	13
Poor documentation process	3.0111	14
Poor communication	2.9667	15
Low level of usage of Information Technology (IT)	2.8333	16
Misunderstandings	2.7111	17

As per the findings shown in the Table 6, financing capabilities, limited credit facilities and high interest rates are identified as the most challenging factors to the development of the Sri Lankan construction industry. The main idea of this finding can be identified as, that the main challenge to the Sri Lankan construction industry faced when trying to innovate, is the lack of capital cost. Due to this particular reason, the investors are discouraged to invest on the innovative new trends and therefore the implementation of new trends is very slow in the industry. Low level of technology usage, lack of usage of innovative building materials and lack of high technical construction equipment are caused to reduce the implementation capability of new trend to the industry. But the impact of those factors is partially neutralized due to the resource of human labor availability within the Sri Lankan context. Lack of professionals and expertise and the lack of skilled workers is not a major challenge in the Sri Lankan industry because industry has recognized that the level of availability of the knowledge and skills in Sri Lanka is comparatively high than the other developing countries. But unavailability of the opportunities to use the knowledge and skills and the inexperienceness on the innovations has become a challenge to Sri Lanka. Further, due to the narrow profit margins of the contractors and due to the competitiveness of the industry, the contractors also discouraged to do the experiments on the innovations in their projects. Poor documentation process, poor communication, low level of usage of IT and misunderstandings are identified as the less challenging factors to the industry. The industry has confirmed that a good documentation and communication process available in almost all the major construction projects in Sri Lanka. Moreover, the industry has satisfied with the level of usage of IT in

construction and documentation process with the use of Auto CAD, MS Office, although it has not sufficiently used to implement the new trends like BIM.

7.4. SUGGESTIONS TO OVERCOME THE CHALLENGES TO THE SRI LANKAN CONSTRUCTION INDUSTRY DEVELOPMENT

In the survey, the respondents were asked to assign a score for each suggestion according to the level of important to the development of the Sri Lankan construction industry. The mean level of importance of each factor according to the all the collected scores has calculated to rank the importance of each suggestion as this analysis. The results of the analysis are given in the table below.

Table 7: Suggestions to Overcome the Challenges to the Sri Lankan Construction Industry Development

Suggestions	Mean	Rank
Conduct research studies to establish that innovation shall lead to time and cost reduction in construction	4.1111	1
Allocate funds to carry out research studies on innovation	4.0556	2
Conduct training programs to construction related professionals	4.0333	3
Get the professional bodies such as IESL, IQSSL etc to identify innovation as a requirement in construction industry	4.0000	4
Provide concessions and tax benefits to the contractors who are engaged in innovation	3.9778	5
Conduct workshops, debates etc among undergraduates in the field of construction	3.9333	6
Provide financial assistance to a certain extent if innovation is considered in projects	3.8222	7
Conduct seminars regarding the benefits in adopting innovation in construction industry	3.8000	8
Conduct seminars to major clients to make them aware of the potential benefits on innovation in construction	3.8000	8
Instruct consultancy firms to promote innovation in the construction industry	3.7111	10
Provide insurance covers specifically for the contractors engaged in innovation	3.6333	11
Include clauses regarding innovation in conditions of contracts such as SBD	3.6000	12
Introduce a criteria in ICTAD registration of contractors regarding innovation	3.5889	13
Introduce National Awards to contractors to award when innovative techniques are implemented	3.5556	14
Develop a panel of professionals who are well experienced in the industry to assist contractors who are implementing innovation	3.4667	15
Give a considerable priority to the contractors who are involved in innovation in government tender procedure	3.4556	16
Provide on the job training in foreign countries where innovation is severely practiced	3.4000	17
Publish articles on construction magazines on the success stories of using innovation in construction	3.3333	18
Identify the negative myths regarding usage of innovation in construction	3.2667	19
Conduct seminars and awareness programs focusing on the identified myths and their validity	3.2222	20
Provide support and assistance through online solutions through a panel of professionals	3.1000	21

As per the results given in the Table 7, conduct research studies has been identified as the foremost requirement. In establishing the innovation it will lead to time and cost reduction in construction to improve quality of the final products. Allocation of funds to carry out research studies on innovation is identified as the second most important suggestions to develop the construction industry to implement the innovations. Financial incapability is the major challenge to the Sri Lankan construction industry development in responding to the innovations and therefore it is necessary to aware the industry about the time and cost benefits of the innovations to encourage the implementation of them. Further, it is necessary to provide financial assistance to encourage the researchers to conduct such researches. In addition, it is important to improve awareness and train the construction industry related professionals to implement the innovations successfully into the Sri Lankan construction industry. Therefore conducting training programmes and CPDs to construction related professionals, and getting involvement of the professional bodies such as IESL, IQSSL etc to identify innovation as a requirement in construction industry. It is necessary to encourage the contractors who do the experiment on implementation innovation in the project to increase the uses of new trends in the Sri Lankan construction industry. Moreover it is required to encourage the projects that innovations are implemented with providing concessions and tax benefits etc. and also to the contractors who are engaged in innovation and providing financial assistance to a certain extent. Awareness of the benefits of the usage of innovations is identified earlier as a way to the implementation of new trends successfully. Therefore, it is needed to aware the clients about the benefits of the innovations will be important step towards bringing in innovation. In addition, there is a major role for the consultant organizations to promote innovation practices as those are the organizations that does the designing works of the construction projects. Therefore, conducting seminars regarding the benefits in adopting innovation in construction industry, conducting seminars to major clients to make them aware of the potential benefits on innovation in construction and instructing consultancy firms to promote innovation in the construction industry were also seen as important suggestions to the construction industry development. However, it has caused to receive a middle level of importance in the rankings to those suggestions being the reason that industry has a doubt about the impact that can be done by the seminars to change the construction industry. However, according to the findings in Table 07,it is visible that mean level of the importance of all the identified suggestions higher than the 3.It has proved the viability and the importance of all of the suggestions to the Sri Lankan construction industry to create better response for the innovation adoption.

8. CONCLUSIONS

Sri Lanka as a developing country was always claimed to be low responsive to innovation in the construction sector. The research was initiated with the identification of the level difference between the implementation of new trends for the construction industry in Sri Lanka compare to the developed countries. Researcher identified this as a challenge to the development of the construction industry in Sri Lanka. Therefore the research aimed to identify the new trends of the construction industry, the adoption of those new trends to Sri Lankan construction industry, barriers to adopt new trends t and the suggestion to overcome the barriers. As the second step of the research, researcher has identified a list of new trends of the construction industry, implementation barriers of new trends and came up with the suggestions for evade the barriers through the comprehensive literature survey. With the intention of identifying the importance and the viability of identified factors for the Sri Lankan construction industry, questionnaire survey was conducted with which has gathered the ideas of ninety respondents who are representing the contactors, clients and the consultant in the construction industry of Sri Lanka. The mean score of each factor has calculated for ranking the importance and the viability of the factors to the Sri Lankan construction industry at the analyzing chapter and identified the waste management, green building concept and the risk management as the most important new trends to the Sri Lankan construction industry and same time it has evaluated their adoption to the Sri Lankan construction industry. According to the findings the adoption of those new trends into the Sri Lankan construction industry is at a miner level. Furthermore research has discovered the major

barrier to the adoption the innovations to the Sri Lankan construction industry as the less motivation of the investors invest on the innovative trends due to the lack of capital cost and finally identified the conducting research studies to establish that innovation shall lead to time and cost reduction in construction and motivate the researchers to conduct the research studies on innovations are the important actions needed to implement to develop Sri Lankan construction industry through response the innovations. Therefore it is expected that implementation the findings of the research would be contributed on the Sri Lankan construction industry development.

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