PROPOSE SUGGESTIONS TO IMPLEMENT BLOCKCHAIN TECHNOLOGY TO IMPROVE THE PRODUCTIVITY OF SRI LANKAN CONSTRUCTION INDUSTRY

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Introduction

National economic growth relies heavily on the construction industry. As a result, many jobs and income are created for overall society by the infrastructure provided by it. In the construction industry, numerous disputes and litigation problems have arisen about payments withheld, quality fraud, and data authentication. Researchers and practitioners have recognized that construction project business processes lack transparency and accountability (Rebecca Yang a, 2020). Supply chain developments in the construction industry are being handicapped by a drop in mean value and a rise in transactions. In construction supply chains, low trust has been an ongoing problem for a long time, because of decentralized teamwork. Through digital technology, it may be possible to achieve the criteria of centralized teamwork with high transparency. It is the primary purpose of these technologies to increase trust, visibility, and traceability as well as strengthen partnerships among key stakeholders regarding the sustainability of the materials (Yang et al., 2020). Many applications of this technology have been proposed and discovered recently in the construction industry (Khawar Ahmed Khan, 2021).Proposing suggestions to implement blockchain in the Sri Lankan construction industry and improving its productivity are the main objectives of this thesis.

Methodology

The main research philosophy for this research is mainly positivism, which is based on the opinions of the people (professionals). To accomplish the study's goals, primary data were gathered thorough a questionnaire survey and semi-structured interviews. A preliminary questionnaire was conducted to obtain data for preparing the expert interviews and a preliminary interview was conducted to obtain data for the preparation of the questionnaire. Preliminary questionnaire and the main questionnaire were prepared with including the structured and unstructured questions. questionnaire was developed and distributed among the professionals in the constructions industry and familiar with blockchain technology. The preliminary interview and the expert interview were conducted by using purposive sampling who are experts in the construction industry and familiar with both the Sri Lankan construction industry and blockchain technology.

The preliminary questionnaire was distributed for collecting further data vague. The preliminary interviews were conducted prior to preparing the main questionnaire. The expert interview was conducted with ten experts and the questionnaire was responded by 35 persons.

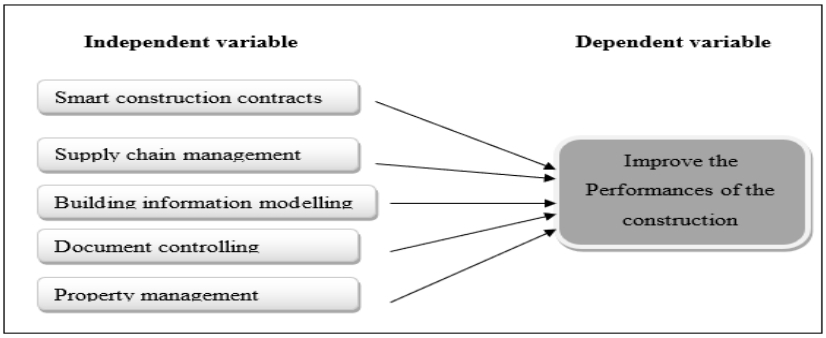

Figure 1: Conceptual Framework

Results and Discussion

According to the literature survey, ten key performance factors (KPIs) Time, Cost, Quality, Safety & Health, Internal Stakeholders, External Stakeholders, Client Satisfaction, Financial Performance, Environment, and Information, Technology & Innovation (E Soewin1, 2017) were used for this study, and they were used in preparing a preliminary questionnaire survey to examine the order of importance. Likert scale accordance with the importance was used for that purpose.

A. Correlation analysis

The results of correlation analysis were shown that there are relationships between the independent and dependent variables.

Correlations

		ASCC	ASCM	ABBM	ADCM	ABPM	AABC
ASCC	Pearson Correlation	1	.757**	.657**	.614**	.474**	.509**
	Sig. (2-tailed)		<.001	<.001	<.001	.004	.002
	N	35	35	35	35	35	35
ASCM	Pearson Correlation	.757**	1	.510**	.475**	.484**	.613**
	Sig. (2-tailed)	<.001		.002	.004	.003	<.001
	N	35	35	35	35	35	35
ABBM	Pearson Correlation	.657**	.510**	1	.606**	.424*	.673**
	Sig. (2-tailed)	<.001	.002		<.001	.011	<.001
	N	35	35	35	35	35	35
ADCM	Pearson Correlation	.614**	.475**	.606**	1	.636**	.586**
	Sig. (2-tailed)	<.001	.004	<.001		<.001	<.001
	N	35	35	35	35	35	35
ABPM	Pearson Correlation	.474**	.484**	.424*	.636**	1	.451**
	Sig. (2-tailed)	.004	.003	.011	<.001		.007
	N	35	35	35	35	35	35
AABC	Pearson Correlation	.509**	.613**	.673**	.586**	.451**	1
	Sig. (2-tailed)	.002	<.001	<.001	<.001	.007	
	N	35	35	35	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Figure 2: Results from correlation analysis (SPSS)

B. Regression analysis

Coefficients						
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.030	.682		.044	.965
	ASCC	.375	.214	.367	1.752	.090
	ASCM	.603	.213	.514	2.828	.008
	ABBM	.536	.178	.489	3.007	.005
	ADCM	.279	.181	.273	1.543	.134
	ABPM	.005	.176	.004	.026	.980
a. Dependent Variable: AABC						

Figure 3: Results of regression analysis (SPSS)

As per the results, the construction industry improves its performance by 37.5% by implementing BCT in smart construction contracts, 60.3% in supply chain management, by 53.6% in BIM, by 27.9% in document management and 0.5% by implementing BCT in property management.

C. Content analysis

According to the experts, all the performance indicators of the construction industry can be improved with adopting to the blockchain technology. Other than the KPI's, as 'Trust and Transparency' are also mentioned throughout the Project Management Body of Knowledge (PMBOK) as significant aspects to be followed, the management process in the construction sector is also can be improved with adaptation to blockchain technology. there are very few blockchain applications used in construction industry. However, there are many proof-of-concept projects, or prototype systems being developed.

Sri Lanka is not in an appropriate level to adopt blockchain technology. Resistance to change could be a big barrier too. BCT is not only for use by one single company. It's a more ecosystem. The knowledge gap and the lack of capability of technical feasibility & the initial cost of implementing are the barriers that can be found in Sri Lanka that effect the implementation of Blockchain technology. If there's a need to use IT professionals to do some jobs, it is preferred to go for joint ventures or collaborations with companies. When integrating with another company, could be a saving. parties could give the knowledge and in return, construction professionals could share construction knowledge as a construction company. And the IT company can develop the system.

After the above suggestions are fulfilled, the experts recommend starting to apply blockchain for payment handling system. The respondents mentioned that after a payment handling system is adopted, then quality tracking in the supply chain can be followed. BCT can be used to track the certification of raw materials and intermediate products. In this way, it can solve supply chain management problems very well. One respondent said further about the areas that can adopt BCT as document management. Trust in the documents, maintenance, facility management, and asset management are the prominent areas in the Sri Lankan construction industry which can use BCT for future implementations.

Conclusion

From the 1st objective, the performance indicators that affect the improvement of the construction industry were identified through secondary data analysis. And ranked through RII analysis method. The 2ndobjective gives a connection to the main two areas that are discussed in the study. Data for this objective was obtained through secondary data and preliminary interviews. Preliminary interviews were gained by four experts in the industry who are familiar with blockchain technology. This objective provides outputs mainly on how blockchain differs from other technologies and what the characteristics of BCT benefit the construction industry. Some visible and research-level blockchain applications were identified through the data collection that is possible to apply in the construction industry. The collected data were analyzed using content analysis.

For the 3rd & 4th objectives, a detailed questionnaire was distributed among construction industry professionals familiar with digitalization technologies and blockchain. SPSS software was used to analyze the collected data. Through that analysis, it was proved that there is a relationship and impact between variables. For both objectives, an expert interview was also conducted. Data was collected by ten experts in the industry who are familiar with BCT. The main outcomes that were obtained are, identifying the characteristics of BCT that will benefit to improve the KPIs with the performances of the construction industry and About the BCT applications that are used in the world in construction.

For the 5th objective, the data collection was fully based on expert interviews. It was analyzed completely through content analysis. The main outcomes that were gained by the expert interviews are, the reasons for not using blockchain in Sri Lanka's construction industry, the readiness of Sri Lanka to adopt BCT, the barriers to implementing BCT in the Sri Lankan construction industry & suggestions and recommendations of professionals on what solutions can be put into practice by the Sri Lankan construction industry to implement BCT.

References

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