p-ISSN : 2685-9106
e-ISSN : 2686-0384
ADI International Conference Series

The Analysis of Construction Supply Chain Management Failure

Amir Anwar[1], **Yenni Carolina**[2]
Accounting Department Maranatha Christian University[1,2]
Email: ameng.fsed@yahoo.com[1], yenzcarolina@gmail.com[2],

To cite this document :
Amir Anwar, & Yenni Carolina. (2021). The Analysis of Construction Supply Chain Management Failure. Conference Series, 3(1), 806-824. Retrieved from https://adi-journal.org/index.php/conferenceseries/article/view/411

Abstract

A multisite construction project is a construction project characterized by the number of construction sites that are managed simultaneously in regional, national and even global coverage. In its implementation and completion, a multisite construction project has field problems with high complexity. This problem is generally caused by the distribution of work locations, relatively short execution times, weather, and access. One of the failure factors in multisite construction is suspected to be the result of the improper and unplanned implementation of SCM (supply chain management). This study aims to provide input to parties involved in multisite CSCM (supply chain management) construction regarding the importance of compiling a correct, precise and effective SCM in multisite construction. Data collection was carried out into three stages, namely literature study, interview and observation. Data from interviews and field observations are interpreted and processed in the NVivo12 application. Based on data processing, it is known that the factors that cause poor multisite CSCM from internal companies are corporate culture, availability of human resources, construction management, while external factors are factors of service users, the involvement of subcontractors, availability of reliable suppliers and work environment. These findings provide a reference for practitioners who use SCM in construction. Based on these findings, practitioners can pay attention to various factors that cause failure in implementing CSCM.

Keywords: supply chain management, construction, multisite.

I. BACKGROUND

Ministry of Public Works and Public Housing (PUPR) through the Center for Educational Facilities and Infrastructure Development, Sports and Markets (PSPPOP) The Directorate General of Human Settlements (Cipta Karya) received the mandate to carry out technical guidance and accelerate the rehabilitation and construction of madrasas and schools throughout Indonesia [1]. From this program, there were 1,679 schools (SD, SMP and SMU) and 179 madrasas (Ibtidaiyah, Tsanawiyah and Aliyah) that had been handled in the 2019 fiscal year. [2].

The Regional Settlement Infrastructure Center (BPPW) of Banten Province also took part in these activities to support the Government's focus on developing superior human resources (HR). [2]. According to the Secretary of the Banten Provincial Education Office, Of the 4,105 school units that were severely damaged and needed repair in 2015, many were in the southern region of Banten, namely in Pandeglang and Lebak districts. [3]. However, improvements to these schools have not been implemented optimally, this is because currently Banten Province is still struggling with disparities in growth and development. The North Banten area is much better in infrastructure development than the South Banten area. [4].

Tabel 1.1 Package of School Facilities and Infrastructure Rehabilitation of Banten PSPPOP

No	Package name	Number of Schools	
		List	Verification
1	Rehabilitation of Basic and Secondary Education Facilities and Infrastructure in Lebak Regency 1	51	41
2	Rehabilitation of Basic and Secondary Education Facilities and Infrastructure in Lebak Regency 2	51	46
3	Rehabilitation of Basic and Secondary Education Facilities and Infrastructure in Lebak Regency 3	51	43
4	Rehabilitation of Basic and Secondary Education Facilities and Infrastructure in Pandeglang Regency 1	41	38
5	Rehabilitation of Basic and Secondary Education	28	22

	Facilities and Infrastructure in Pandeglang Regency 2		
6	Rehabilitation of Basic and Secondary Education Facilities and Infrastructure in Tangerang Regency, Serang Regency and Serang City	15	15
7	Rehabilitation of Facilities and Infrastructure for Madrasah Aliyah and Madrasah Tsanawiyah	11	11
	total	284	216

Source: Banten Infrastructure and Settlement Center (BPPW) 2019

Looking at the distribution of locations (Table 1.1), The school rehabilitation work has a fairly wide distribution on each package. Each package has 11 - 51 locations. More than 90% (ninety percent) of school locations verified to be rehabilitated are in the South Banten area. The wide distribution makes this work a multi-site construction project. A multisite construction project is a construction project characterized by the number of construction sites that are managed simultaneously in a regional, national or global scope. Multi-site projects are very characteristic, fast site turnover, rigid specifications, geographic differences, cultural diversity, and dependence on third parties [5].

Multi-site construction projects under implementation and completion have field problems with high complexity [6]. The variety of problems can be seen from the distribution of work locations, short execution times, weather, and poor access (tends to be bad). Improper and unplanned SCM implementation is suspected as one of the failure factors in multisite construction. This is a classic problem experienced by many construction projects, and can be detrimental for many parties [7].

As the main coordinator, the contractor is in a strategic position to manage all stakeholders and various resources throughout the planning of material supply in order to anticipate the risk of supply delays that can result in the project not being on time [7]. Risk can be caused by many things along the supply chain, however there are 4 categories of sources of risk, namely, Supply, Control, Process and Demand [8].

Geographical location, material suppliers and their distance from the construction site are factors that have a significant influence on construction costs, time and quality [9]. This requires a systematic management so that the project is not late. [10]. Facing that challenge construction companies began to invest in new skills and development of integrated SCM for the purpose of competitive positioning [11]. Planning and application of SCM Construction is a very promising approach to successfully achieve integration between several chain disciplines, namely suppliers, designers / consultants, vendors, supplier / supplier contractors, subcontractors, transportation and storage and external internal clients [9], [12], [13].

From the above studies and many other previous studies, it is known that SCM can be implemented in construction work. This reflects that SCM can also be implemented in multi-site construction work. Proper and accurately coordinated SCM planning is expected to solve the problem of material procurement delays in multi-site construction. In addition, this research is expected to contribute by filling in the gaps in knowledge, which until now no one has discussed specifically about the design of implementing SCM in multisite constructions.

II.RESEARCH OBJECTIVES AND BENEFITS

1. Research purposes

This research is expected to provide an analysis of the causes of poor supply chain management in multisite constructions. The method used to achieve this goal is to identify and identify factors for failure of multisite constructions caused by poor SCM. After identification, the researcher offers SCM attributes that can be implemented in multisite Construction Supply Chain Management (CSCM).

2. Benefits of Research

The research provides input to service users (government / owners, multisite construction management), service providers (contractors) and consultants (planning consultants and supervisory consultants) that the importance of compiling correct, precise and effective SCM in multisite construction Some of the benefits that can be expected from this research, among others;

1) Theoretically, this study provides an overview of the importance of compiling a multisite CSCM scheme and implementing SCM effectively so that construction failures caused by SCM can be minimized.
2) Practically, this research provides a construction SCM design by analyzing the SCM attributes that can be implemented in multisite and CSCM.
3) Encourage improvement of multisite construction governance management by improving CSCM performance.

III. RESEARCH METHODS

The descriptive qualitative approach used in this research is the research process that is carried out naturally and naturally in accordance with the conditions that occur in the field without any manipulative elements to the data collected [14]. Meanwhile, the research protocol used a Systematic review to classify and summarize the results of descriptive qualitative studies. The research protocol process begins with identifying questions, determining the location of the database, selecting and selecting data and research results relevant to the research objectives, extracting and finally presenting the results of the meta-synthesis.

Research data collection was carried out in 3 ways, namely literature studies, interviews and observations to multisite work locations. Interviews were conducted directly with service users, service providers and experts. The service users in question are the Banten Regional Settlement Infrastructure Center (BPPW), the Banten Provincial Education Office, the Regency / City Education Office and Schools benefiting from the multisite rehabilitation project from BPPW Banten. Service providers are parties who are partners, both individuals and business entities including Consultants (BPPW Individual Consultants, Planning Consultants and Supervisory Consultants), Contractors (main contractors and Subcontractors) and Suppliers (Distributors, Agents, Stores and other Suppliers) . While the experts referred to are experts who understand SCM and multisite construction in Indonesia. These experts consist of academics, researchers and other individuals who have sufficient understanding and knowledge.

For interview data, researchers submitted 43 interview proposals to potential sources in Bandung, Bekasi, Jakarta, Tangerang, Serang, Cilegon, Pandeglang and Rangkasbitung. Of the 43 proposals, 21 of them became sources and were successfully interviewed. There were several obstacles in conducting interviews apart from the availability of resource time, the Covid 19 pandemic was one of the obstacles in realizing the interview process. Several interview plans were cancelled due to the implementation of Large-Scale Social Restrictions (PSBB) and social distancing. The results of the analysis of interview data from 21 interviews were assumed to represent the sources involved in a multi-site construction project.

In addition, researchers also conducted field observations. Observation data is supporting data to strengthen data obtained from literature and interviews. Researchers make visits and direct reviews to the sites that are the object of this research in order to explore more deeply the phenomena that occur. Some of these observations were also accompanied by direct interviews in the field. During this observation visit, the researcher prepared a "Field

Visit / Observation Form" and a camera, this was done in addition to recording visual observation data as well as to strengthen the validity of the research data.

IV. INTERNAL AND EXTERNAL ASPECTS OF MULTISITE CSCM IMPLEMENTATION

1. Internal Aspects of Multisite CSCM Implementation

Construction is an industry that operates in an environment and conditions full of uncertainty. The complexity of the activities in a construction project causes the construction project to involve many parties, either directly or indirectly. Ideally, construction projects should be completed on time with the right budget and good quality, or in other words, construction projects are always tied to the Triple Constraint, namely Implementation Time, Budget and Quality of Work. Research [15] states that there are three emphases in every construction project, namely (1) the project is always in uncertainty, planning is sometimes not in line with what is happening in the field, (2) creating integrated needs for each resource in each part of the project and (3)) is subject to the urgency of delivering the desired results over a predetermined time frame.

Construction companies must focus on strategies that will improve the quality of their products / services and reduce unit production costs at each stage of construction especially in the supply chain. CSCM management involves many parties and is full of challenges. Companies must be able to build trust and collaboration among supply chain partners and implement the best methods that can facilitate the supply chain process. Furthermore, research [16] reveals that there are 9 key success factors (Critical Success Factor / CSF) in order to achieve supply chain and operation success. The 9 CSFs that are responsible for the greater impact on the industry are (1) Use of Information Technology, (2) Commitment to Management, (3) Partnership / Integration, (4) Quality of service, (5) Process, (6) Resources Ability, (7) Government intervention, (8) Skilled employees, (9) Trust.

2. Corporate Culture

SCM is proven to be successful in being applied to the Manufacturing Industry, but it is not successful in its application in the Construction Industry which is marked by the high number of waste. This is due to the very basic differences between the manufacturing industry and the construction industry. The manufacturing industry is a repeated production cycle with the same activities and use of materials so that it can be taken into account in more detail. Meanwhile, the construction industry is an industry that has different characteristics for each project. The same job in different times and places will be treated differently, especially if there are different jobs, times and places. Even a construction project can differ from planning in its implementation.

Company habits and culture greatly influence the success of CSCM in construction projects. Successful CSCM can be achieved if management focuses on how to use their own products, planning processes, mastery of technology, and the ability to integrate the construction process [17]. The CSCM process includes the flow of materials, labor, information, fabrication, and equipment coming from many different parties. Several sources said that the construction service providers had not implemented the CSCM strategy correctly. The service provider already knows the intent and purpose of the CSCM preparation but is still limited as a formality document for the implementation of the work. Planning and material management is fully entrusted to field officers at work sites. Even if the work is subcontracted, the main contractor only calculates the installed volume without questioning the procurement and distribution process of materials.

From the results of observations and interviews with resource persons, in principle, service providers (main contractors and subcontractors) already understand the importance of planning and managing supply chains. Apart from the lack of reliable human resources and knowledge of CSCM, inconsistent policies and lack of willingness from service providers are deemed insufficient to implement SCM in construction projects.

3. Human Resources

Almost all interviewees who were successful in the researcher's interviews stated that companies involved in multisite work did not have special personnel to handle supply chain management. Supply chain planning is carried out based on practices in previous projects. The main contractor only provides a field coordinator who controls and manages project performance within the corridors for which he is responsible. subcontractors assign field managers to project units for which they are responsible. Material needs are submitted by the foreman who is sometimes also the contractor of paying wages. This condition occurs because most small and medium construction companies do not have experts and permanent workers. Experts and directors work only at the time of project implementation. This was also revealed in interviews with several sources.

In practice, service provider directors have control over all material needs in the field. Officers in the field provide a record of material needs to the directors, while the decision is when to supply and who is the supplier of the directors who decide. Most service providers have not been able to manage and plan the supply chain properly. Even in several interviews, the informants did not know if there was training on CSCM, but they gave a positive response and were very interested in participating in the training.

4. Construction Management

Many studies say that project management is one of the determining factors for the success of CSCM. The main problem in multi-site project management is the management's ability to formulate and organize systems in planning, scheduling and supply chain control [18]. It is common knowledge that most small and medium companies in Indonesia do not yet have project managers who have qualified project control skills. The skills of a project manager greatly influence the CSCM pattern in construction companies. Skills in oral and written communication of a project manager are not only obtained from training and school but can also be obtained from previous experiences. These skills can be useful and are one of the keys to success in CSCM planning [19].

A multisite construction project involves many parties in its implementation but there is no Construction Management Consultant in it, either from service users or from service providers. From the service user, the Supervisory Consultant prepares from the consultant Service auction mechanism and also prepares Individual Consultants as an extension of the service user in overseeing the progress of the work. Basically, a multisite construction project involves many parties in the supply chain. In this supply chain series, in addition to human and material resources, it also involves data systems, software, accounting, transport fleets, equipment and other supporting facilities. Seeing the complexity of activities in the multisite construction supply chain, the roles of the project manager and the construction management team are very central.

V. RESULTS & FINDING

The influence of independent variable on the dependent variable and to the hypothesis is tested by Structural Equation Modelling (SEM). SEM used is SmartPLS 3. The stages in data processing are divided into 2, which are testing the outer model and testing the inner model. Outer Model Testing (Measurement Model Testing) At this stage, there are two things to be analysed, namely convergent validity, discriminant validity, and Cronbach's alpha, and composite reliability [33]. The results of data processing are presented as follows :

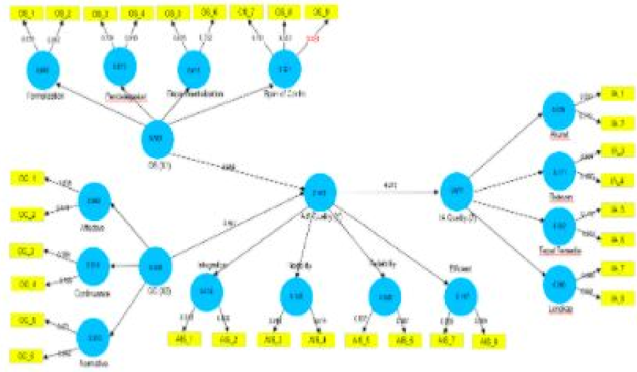

Fig 1. Measurement Model.

Convergent Validity

The loading factor value is used as a benchmark in conducting validity testing. The Loading Factor value is seen for each dimension and each indicator. Each dimension and indicator is valid if its loading factor is above 0.7 value [33]. However, in the early stages of research, the development of a *loading* value measurement scale of 0.5 to 0.6 is still acceptable [34]. From the above processing, the OS9 indicator is declared invalid and excluded from further processing.

The table below presents the test results for the *loading factor* and *convergent validity*.

Table 1. Outer Loading

Measurement Instruments	Outer Loading	Status (>0,5)
OS_1	0,678	Valid
OS_2	0,897	Valid
OS_3	0.724	Valid
OS_4	0.910	Valid
OS_5	0.876	Valid
OS_6	0.732	Valid
OS_7	0.701	Valid
OS_8	0.832	Valid
OS_9	0.438	Tidak Valid
OC_1	0.635	Valid
OC_2	0.578	Valid
OC_3	0.789	Valid
OC_4	0.769	Valid
OC_5	0.871	Valid
OC_6	0.942	Valid
AIS_1	0,913	Valid
AIS_2	0,802	Valid
AIS_3	0,743	Valid
AIS_4	0,814	Valid
AIS_5	0,887	Valid
AIS_6	0,587	Valid
AIS_7	0,809	Valid
AIS_8	0,984	Valid
IA_1	0,991	Valid
IA_2	0,719	Valid
IA_3	0,504	Valid
IA_4	0,905	Valid
IA_5	0,713	Valid
IA_6	0,997	Valid
IA_7	0,868	Valid
IA_8	0,841	Valid

The *loading factor* value in the table above shows the magnitude of the relationship between latent variables on each of the indicators. The *loading factor* value can be seen directly in the *output outer setting* in the SmartPLS algorithm results. The results show that all indicators used in this study are valid.

Discriminant Validity

Indicator variables can be measured by evaluating the outcomes of cross-loading, which reveals that the correlation worth of indicators in the identical variable is healthier than the symptoms for different variables. For all constructs it is symbolize as follows:

Table 2. Cross Loading

	X1	X2	Y	Z
OS_1	**0.678**	0.484	0.122	0.217
OS_2	**0.897**	0.482	0.137	0.185
OS_3	**0.724**	0.494	0.190	0.350
OS_4	**0.910**	0.479	0.191	0.336
OS_5	**0.876**	0.464	0.460	0.464
OS_6	**0.732**	0.482	0.520	0.482
OS_7	**0.701**	0.453	0.491	0.453
OS_8	**0.832**	0.464	0,211	0,054
OS_9	**0.438**	0.482	0,369	0,226
OC_1	0.377	**0.635**	0,346	0,301
OC_2	0.345	**0.578**	0,266	0,003
OC_3	0.372	**0.789**	0,356	0,137
OC_4	0.310	**0.769**	0,392	0,230
OC_5	0.362	**0.871**	0,799	0,219
OC_6	0.277	**0.942**	0,871	0,335
AIS_1	0.298	0,228	**0.913**	0.141
AIS_2	0.360	0,181	**0.802**	0.260
AIS_3	0,209	0,186	**0.743**	0.288
AIS_4	0,398	0,349	**0.814**	0.276
AIS_5	0,389	0,226	**0.887**	0.274
AIS_6	0,156	0,088	**0.587**	0.258
AIS_7	0,264	0,055	**0.809**	0.191
AIS_8	0,276	0,133	**0.984**	0.280
IA_1	0.077	0.151	0.193	**0.991**
IA_2	0.078	0.194	0.241	**0.719**
IA_3	0.105	0.232	0.278	**0.504**
IA_4	0.140	0.154	0.246	**0.905**
IA_5	0.124	0.145	0.244	**0.713**
IA_6	0.073	0.104	0.202	**0.997**
IA_7	0.147	0.165	0.256	**0.868**
IA_8	0.185	0.214	0.264	**0.841**

As the value of cross-loading test above shoes, it complies to the standard, that all indicators are valid because they have the highest correlation value with each of its dimensions, compared to the other dimensions.

Table 3. Average Variance Extracted (Convergent Validity) test results

	AVE	Status (>0,5)
Struktur Organisasi	0.768	Valid
Komitmen Organisasi	0.891	Valid
Kualitas Sistem Informasi Akuntansi	0.773	Valid
Kualitas Informasi Akuntansi	0.675	Valid
Formalization	0.613	Valid
Delegation	0.698	Valid
Departmentalization	0.568	Valid
Span of Control	0.732	Valid
Affective	0.590	Valid
Continuance	0.609	Valid
Normative	0.761	Valid
Integration	0.815	Valid
Flexibility	0.830	Valid
Reliability	0.601	Valid
Efficient	0.583	Valid
Akurat	0.671	Valid
Relevan	0.588	Valid
Tepat Tersedia	0.609	Valid
Lengkap	0.712	Valid

The convergent validity measure in average variance extracted (AVE) values. AVE value more than 0.5 is required for the variable is declared valid [33]. Based on the AVE value above, it can be concluded that the 11 latent variable constructs have good validity (AVE> 0.5). This means that the information contained in each latent variable can be reflected in the manifest variable.

Cronbach's Alpha and Composite Reliability

Model reliability measurement is tested with Cronbach's Alpha and Composite Reliability. This can be seen from the output overview on the results of the SmartPLS algorithm. The criteria for the recommended value is above 0.700 [33]. The following are the results of Cronbach's alpha test, and also composite reliability for each research variable:

Table 4. Reliability Testing

	cronbach's alpha	*composite reliability*	Status (>0,7)
Struktur Organisasi	0.966	0.972	Reliable
Komitmen Organisasi	0.986	0.988	Reliable
Kualitas Sistem Informasi Akuntansi	0.983	0.985	Reliable
Kualitas Informasi Akuntansi	0.966	0.972	Reliable
Formalization	0.876	0.713	Reliable
Delegation	0.887	0.815	Reliable
Departmentalization	0.765	0.897	Reliable
Span of Control	0.804	0.926	Reliable
Affective	0.839	0.985	Reliable
Continuance	0.867	0.977	Reliable
Normative	0.912	0.890	Reliable
Integration	0.776	0.882	Reliable
Flexibility	0.882	0.761	Reliable
Reliability	0.876	0.803	Reliable
Efficient	0.812	0.820	Reliable
Akurat	0.797	0.777	Reliable
Relevan	0.901	0.841	Reliable
Tepat Tersedia	0.888	0.916	Reliable
Lengkap	0.872	0.822	Reliable

The results of the Cronbach's Alpha test and Composite Reliability are declared reliable because each variable has a value that exceeds the recommended value. This shows that the measurement model has good reliability. Thus, it can be stated that the measurement model is valid and reliable so that it can meet the requirements for further analysis.

Inner Model Testing (Structural Model)

In this analysis phase, two things become the test tools, the R Square (R^2), Q Square (Q^2) [33] analysis, and the t-statistical test to test the partial hypothesis obtained by using Bootstrapping calculations in the SmartPLS application [34].

R Square Analysis (R^2)

The R Square (R^2) analysis was performed on each endogenous latent variable which shows the degree of influence received by the endogenous latent variable from each exogenous variable that contributed to it. The greater the R^2 value, the greater the effect received by the endogenous variables [33].

Table 5. R Square (R^2) on Endogenous Variables Analysis

Based on the table above, we can learn that variable Quality of AIS (Y) is influenced by Organizational Structure (X1) and Organizational Commitment (X2) of R^2 = 44.3%, and variable Quality of Accounting Information (Z) is influenced by Quality of AIS (Y) of R^2 = 61.1%.

Q Square Analysis (Q2)

The value of Q Square is used to see the greatness in the structural model where *predictive relevance* predicted if$Q^2 > 0$, and the model does not have *predictive relevance*.if Q^2 model < 0

Table 6. Q Square Analysis (Q^2)

	cronbach's alpha
Struktur Organisasi	-
Komitmen Organisasi	-
Kualitas Sistem Informasi Akuntansi	0.443
Kualitas Informasi Akuntansi	0.611
Formalization	0.643
Delegation	0.519
Departmentalization	0.618
Span of Control	0.521
Affective	0.643
Continuance	0.519
Normative	0.513
Integration	0.312
Flexibility	0.129
Reliability	0.523
Efficient	0.117
Akurat	0.639
Relevan	0.711
Tepat Tersedia	0.602
Lengkap	0.590

Variabel Laten	Q *Square* (Q^2)
Y (Kualitas Sistem Informasi Akuntansi)	0.269
Z (Kualitas Informasi Akuntansi)	0.057

Based on the table 6, the Organizational Structure (X1) and Organizational Commitment (X2) model on the Quality of AIS has a Q^2 value of 0.269 where the value > 0 means that the model has good *predictive relevance*. The AIS Quality Model (Y) on the Quality of Accounting Information (Z) has a Q^2 value of 0.057 where the value > 0 means the *predictive relevance* was considered good.

Hypothesis Testing

Hypothesis testing is already used to check the influence of the latent variables. In SmartPLS to check the importance of the trail coefficient utilizing bootstrap with a significance stage of 5%. The outcomes of the calculations to check the speculation are appeared within the following table.

Table 7. Hypothesis Testing

Hipotesis	*Original Sample* (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*Standard Error* (STERR)	T-*Statistics* (IO/STERRI)	p-*value*	Kesimpulan
X_1 (OS) -> Y (AISQuality)	0.315	0.322	0.120	0.120	2.624	0.009	Signifikan, H1 diterima
X_2 (OC) -> Y (AISQuality)	0.335	0.323	0.149	0.149	2.245	0.025	Signifikan, H2 diterima
Y (AISQuality) -> Z (IA Quality)	0.260	0.270	0.083	0.083	3.127	0.002	Signifikan, H3 diterima

The interpretation of the process and results of testing the hypothesis above is presented as follows:

The Effect of Organizational Structure on the Quality of AIS

Using SmartPLS 3 the results which are presented in the table above with a significance level of 5% can be seen from the original sample value of 0.315 which indicates a positive value. The resulting T-statistic is 2,624 > T-table (1,960) and the p-value is 0.009 < 0.05. Thus H1 in the study is accepted, meaning that the organizational structure has a positive effect on the quality of the AIS.

The Effect of Organizational Commitment on the Quality of AIS

Using SmartPLS 3 the results which are presented in the table above with a significance level of 5% can be seen from the original sample value of 0.335 which indicates a positive value. The resulting T-statistic value is 2,245 > T table (1,960) and the p-value is 0.025 < 0.05. Thus, H2 in the study is accepted, meaning that organizational commitment has a positive effect on the quality of the AIS.

Effect of the Quality of AIS on the Quality of Accounting Information

Using SmartPLS 3 the results are presented in the table above with a significance level of 5%. It can be seen from the original sample value of 0.260 which indicates a positive value. The resulting T-statistic value is 3.127 > T table (1.960) and the p-value is 0.002 < 0.05. Thus H3 in the study is accepted, meaning that the quality of the accounting information systems have a positive effect on the quality of accounting information.

VI. SCM ATTRIBUTE AS THE KEY TO SUCCESSFUL MULTISITE CSCM

1. Integrated Information System

The biggest challenge in building an integrated CSCM is managing the flow of information into and out of the project. Management of information systems greatly influences planning and evaluation of logistics. The diverse characteristics and geographic location of the project sites make an effective information and communication system between the central and regional division project teams indispensable.

The results of observations show that communication between field officers, the administration section and company directors has not been effective. Communication only relies on cellphone and social media (whatsapp) as a medium for sharing project data. Meanwhile, the integrated and integrated data system has not been built and has not even been planned. This was also revealed from interviews with almost all informants. At this time, the pattern of communication and project coordination was still very conventional. Field workers greatly determine the policies that will be taken by the directors, so that directors have difficulty innovating in the supply chain. Directors' data is field data which is the result of a coordination meeting conducted by the site manager, foreman and supervisor.

Regarding this [24], in his study suggested a coordination mechanism for CSCM constructs that uses internet enabled mechanisms to improve the coordination process. This is in line with research [25] which references the use of Cloud Data (data cloud) together in coordination on multi-site projects with certain restrictions in accessing data between central management and work sites.

2. Logistics Procurement Strategy.

Multisite CSCM is very vulnerable to the uncertainty of time, quantity, quality, and price of the materials, labour and equipment needed in the process. This uncertainty occurs in all procurement activities at each stage of construction. Service providers are required to carry out comprehensive planning and control of logistic activities. The results of field observations prove that service providers prefer to pile up materials at work sites in order to anticipate all uncertainties, even though they realize this will result in inefficient, wasteful use of materials and increase storage costs. Nonetheless, stockpiling measures are still considered an effective way of reducing the risks associated with a number of uncertainties that may arise in the supply network (eg, late delivery, incomplete orders, quality deficiencies).

According to [26] Uncertainty in supply chain arises largely due to the lack of available and accurate information regarding the status of materials at different stages in the supply network construction. This reinforces the basic concept in integrated multisite CSCM, namely developing an integrated and integrated logistics procurement strategy. So as to minimize the occurrence of conflicts of needs, ordering errors, delays, wrong scheduling between sites.

3. Logistic Distribution Strategy.

Logistic distribution is an important part of integrated multisite CSCM. The wide distribution and geographical location cause distribution planning to always change depending on the terrain and weather conditions at the work location. The accuracy of the information determines the accuracy of the strategy. In some work sites, sometimes a material transport vehicle cannot directly enter the work site. Distribution is sometimes carried out with the help of smaller vehicles, some are even transported using two-wheeled vehicles. Observations and interviews show that providers do not yet have a well-planned and integrated distribution pattern and strategy.

4. Storage and Warehouse

Almost all implementing contractors in multi-site work that are the object of this research do not have a warehouse specifically at the work site. The main contractor has a warehouse located in the main office, the additional warehouse is a transit warehouse before being taken to the work site. This transit warehouse will normally supply several adjacent sites. After the materials are distributed to the work site, neither the main contractor nor the subcontractor appears to have a warehouse. Materials that are susceptible to weather are stored in unused classrooms (being repaired) while bulk materials are placed in open fields which sometimes interfere with circulation in the work area. Material treatment in the field is important because it is related to efficient use of materials to prevent cost overruns. Materials that are mistreated in the field run the risk of spoilage, deterioration of quality, loss and deficiency before use.

5. Treatment of Residual Logistics and Waste

In integrated CSCM the treatment of Logistics, Waste and Waste is the final stage in the supply chain before a comprehensive evaluation of the supply chain is carried out. Remaining Logistics, Waste and Waste is closely related to how the ordering pattern, meeting field needs, distribution distribution patterns and material treatment in the field.

REFERENCES

[1] I.Suprijanto,"kementerian-pupr-targetkan-perbaiki-2000-sekolah-dan-300-madrasah-tahun-2019," 2019. [Online]. Available: https://www.bulelengkab.go.id/detail/artikel/kementerian-pupr-targetkan-perbaiki-2000-sekolah-dan-300-madrasah-tahun-2019-93. [Accessed: 08-Aug-2019].

[2] K. PUPR, "Kementerian PUPR Rehabilitasi 1," 2020.

[3] D. Prasetya, "4105-ruang-sekolah-di-banten-rusak-parah.," 2015. [Online]. Available: https://www.merdeka.com/peristiwa/4105-ruang-sekolah-di-banten-rusak-parah.html. [Accessed: 09-Aug-2019].

[4] W. Halim, "ketimpangan-masih-belum-tuntas," 2018. [Online]. Available: http://bantenraya.com/berita/2018/10/04/2984/ketimpangan-masih-belum-tuntas. [Accessed: 08-Aug-2019].

[5] N. Blismas, W. Sher, and T. Thorpe, "NATIONAL AND GLOBAL MULTI-SITE PROJECTS," vol. 2, no. September, pp. 9–11, 1998.

[6] M. Petrullo, S. A. Jones, B. Morton, and A. Lorenz, "Challenges and Opportunities in Multi-Site Construction," 2019.

[7] J. Utomo, D. Hatmoko, and F. Kistiani, "Model Simulasi Risiko Rantai Pasok Material Proyek Konstruksi Gedung," Media Komun. Tek. Sipil, vol. 23, no. 1, pp. 1–13, 2017, doi: doi: https://doi.org/10.14710/mkts.v23i1.14697%0AModel.

[8] R. Mason-jones and D. R. Towill, "Coping with Uncertainty : Reducing " Bullwhip " Behaviour in Global Supply Chains," 2000.

[9] M. N. Jadid and M. M. Idrees, "A Geographic Interactive Supply Chain Management System for Construction Projects," vol. II, pp. 23–25, 2013.

[10] Riswandi, M. Natalia, Mafriyal, Gusriyaldi, and T. Cristiani, "Faktor Penyebab Kegagalan Akibat Keterlambatan Proyek Konstruksi Pada Bangunan Gedung di Kota Padang," JIRS, vol. XV, no. April, pp. 24–36, 2018.

[11] M. Khalfan, P. Mcdermott, and R. Cooper, “Integrating The Supply Chain Within Construction Industry,” in Khosrowshahi, F (Ed.), 20th Annual ARCOM Conference, 1-3 September 2004, Heriot Watt University. Association of Researchers in Construction Management, 2004, vol. 2, no. September, pp. 897–904.
[12] V. C. Durai and D. K. Sentamilselvan, “A STUDY ON SUPPLY CHAIN FRAME WORK IN CONSTRUCTION,” vol. 4, 2016, doi: 10.5281/zenodo.60690.
[13] G. A. Papadopoulos, N. Zamer, S. P. Gayialis, and I. P. Tatsiopoulos, “Supply Chain Improvement in Construction Industry,” Univers. J. Manag., vol. 4, no. 10, pp. 528–534, 2016, doi: 10.13189/ujm.2016.041002.
[14] M. Raharjo, “STUDI KASUS DALAM PENELITIAN KUALITATIF: KONSEP DAN PROSEDURNYA,” UIN Maulana malik Ibrahim Malang, no. April. pp. 1–28, 2017.
[15] J. R. Turner and R. Müller, “On the nature of the project as a temporary organization,” Int. J. Proj. Manag., vol. 21, no. 1, pp. 1–8, 2003, doi: 10.1016/S0263-7863(02)00020-0.
[16] M. S. A. Talib, A. B. A. Hamid, and A. C. Thoo, “Critical success factors of supply chain management: A literature survey and Pareto analysis,” EuroMed J. Bus., vol. 10, no. 2, pp. 234–263, 2015, doi: 10.1108/EMJB-09-2014-0028.
[17] E. Salami, S. Aydinli, and E. L. Oral, “Barriers to the Implementation of Supply Chain Management- Case of Small to Medium Sized Contractors in Turkey,” vol. 5, no. 9, pp. 516–520, 2016, doi: 10.21275/ART20161582.
[18] I. N. Hashim and N. Chileshe, “Major challenges in managing multiple project environments (MPE) in Australia’s construction industry,” J. Eng. Des. Technol., vol. 10, no. 1, pp. 72–92, 2012, doi: 10.1108/17260531211211890.
[19] G. Briscoe, A. R. J. Dainty, and S. Millett, “Construction supply chain partnerships: Skills, knowledge and attitudinal requirements,” Eur. J. Purch. Supply Manag., vol. 7, no. 4, pp. 243–255, 2001, doi: 10.1016/S0969-7012(01)00005-3.
[20] A.-W. Ghaith, “Supply chain management in construction Revealed,” Constr. Proj. Manag. An Integr. Approach, no. March, pp. 308–339, 2005, doi: 10.4324/9780203006986.
[21] G. Wang, A. Gunasekaran, W. T. Eric, and T. Papadopoulos, “Big data analytics in logistics and supply chain and applications Reference : Big Data Analytics in Logistics and Supply Chain Management : Certain,” Intern. J. Prod. Econ., 2016, doi: 10.1016/j.ijpe.2016.03.014.
[22] F. Maulani, A. Suraji, and B. Istijono, “Analisis Struktur Rantai Pasok Kontruksi Pada Pekerjaan Jembatan,” J. Rekayasa Sipil, vol. 10, no. 2, p. 1, 2014, doi: 10.25077/jrs.10.2.1-8.2014.

[23] F. T. T. Phua and S. Rowlinson, "Cultural differences as an explanatory variable for adversarial attitudes in the construction industry: The case of Hong Kong," Constr. Manag. Econ., vol. 21, no. 7, pp. 777–785, 2003, doi: 10.1080/0144619032000108245.

[24] X. Xue, Y. Wang, Q. Shen, and X. Yu, "Coordination mechanisms for construction supply chain management in the Internet environment," Int. J. Proj. Manag., vol. 25, no. 2, pp. 150–157, 2007, doi: 10.1016/j.ijproman.2006.09.006.

[25] I. Petri, T. Beach, O. F. Rana, and Y. Rezgui, "Coordinating multi-site construction projects using federated clouds," Autom. Constr., vol. 83, no. June, pp. 273–284, 2017, doi: 10.1016/j.autcon.2017.08.011.

[26] D. A. Young;, F. A. Carl T. Haas, Ph.D., M. A. Paul Goodrum, Ph.D., and A. M. A. Carlos Caldas, Ph.D., "Improving Construction Supply Network Visibility by Using Automated Materials Locating and Tracking Technology," J. Constr. Eng. Manag., no. NOVEMBER, pp. 1–13, 2011, doi: 10.1061/(ASCE)CO.1943-7862.