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Research Article

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Construction Supply Chain Management Systems in Lagos State, Nigeria

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Abstract The management of Construction Supply Chain has a profound effect on profitability and project expectations in terms of cost, time, and quality and risk reduction. Large numbers of suppliers involved in project delivery and complexities of business processes have also necessitated the studying of Construction Supply chain management systems in the Construction Industry. However, there is limited research on the construction supply chain in Nigeria. To address this, a questionnaire survey was conducted in Lagos State to identify construction supply chain management systems in use. In total, 100 questionnaires were administered randomly to selected medium and large-sized firms with a response rate of 54%. The data was analysed using frequency distribution and Relative Importance Index. From the analysis of results, personal relationship was revealed as the most commonly used systems with 63.0%. It was also found that, 42.6% of respondents are discouraged by lack of trust for suppliers and that long-term relationship between contractor and supplier is the most likely systems of improving contractors-suppliers relationships.

Keywords Supply chain, supply chain management systems, construction supply chain

Introduction

Poor productivity, waste, cost and time overruns, and conflicts and disputes have contributed to the failures of the construction industry for a long time and these problems are magnified by the interrelationships between the main contractor and suppliers [1-2]. Pryke [3] observed that key players in Construction Supply Chain are usually unwilling to cooperate with one another in achieving the project goal across Construction Supply Chain. There is limited coordination and collaboration between the design professionals, main contractors, subcontractors, and suppliers involved during the life-cycle aspects of the project; this adversarial behaviour of project participants causes dissatisfaction throughout the supply chain and results in arms-length, one-time, project-focused relationships. Therefore, it has become imperative to streamline the objectives of project parties in order to guide against friction, minimize waste and achieve common goals of improving productivity [1,4].

The Construction Industry is facing management problems in its supply chain, while purchasing contracts are often negotiated and not well-managed with very little information and integration plan for the organization; thereby needing a mechanism for managing these different functions [5-6]. Supply Chain Management has been argued to increase productivity, reduce time, increase cash-flow efficiency and minimize risk [7-8] and is expected to be adaptive to change especially when clients request a better product and more reliable services [9]. The management of Construction Supply Chain has a profound effect on profitability and project expectations in terms of cost, quality and functionality [10] and as assessed by Vrijhoef et al. [11] the ineffectiveness of the Construction Industry and its many problems are supply chain problems among which are difficulties in finding out client's wishes, incorrect documents, design changes, inaccurate information, adversarial bargaining, substandard and defective deliveries, defective works, unrealistic planning and time overrun.

Products and services provided by subcontractors and suppliers typically account for 80% of the total cost of projects, portending an ever-expanding supply chain as packages for main contractors to manage [12]. Latham (1994) and Egan (1998) opined that Construction Industry can improve on the efficiency of operation in its

supply network by establishing an effective Supply Chain management. Construction Supply Chain has been described by authors as a process where different companies form a wide range of trades are supplying materials, components and services in a Construction project [2, 13-16]. Cutting-Decelle et al. [6] described Supply Chain as a network of facilities and distribution options that functions to procure materials, transform these materials into intermediate and finished products, and distribute these finished products to customers. Benton and McHenry [1] argued that Construction Supply Chain Management focuses on strategies for Just-In-Time purchasing, supplier evaluation, subcontractor selection, subcontractor relationship management, equipment acquisition, information sharing, and project quality management where each organization within the supply chain can reduce its own costs and increase its project performance through strategic and process coordination. Xue et al. [2] argued that Construction Supply Chain is not just a chain of construction business with business-to-business relationships but a network of diverse organization and relationships, which includes the flow of information, flow of materials, services or products; and that it consists of all the construction business processes, from the demands by the client, conceptual, design and construction to maintenance. Construction Excellence [10] observed that Supply Chain management gives structure to collaborative arrangement between suppliers and contractors and is essential to monitoring and control of construction logistics activities because of complexity of the Construction Supply process which usually causes resources like equipment, labour, materials and other services not to be available on time, in right amounts and in the desired quality and price [17].

Management of materials and information flows are tactical priorities for construction firms that desire to give value for clients' investments [18] and the production of high-quality projects by main contractors without quality materials and well-informed subcontractors, pushing quality responsibility down to its subcontractors and material suppliers [1]. Nevertheless, the adverse characteristics of Construction Supply Chain includes the multi trades of suppliers involved, complexities of business processes, short-term focus and these have necessitated the studying of Construction Supply chain management systems in the Construction Industry [19]. Considering that every construction project is a typical make-to-order supply chain creates a new product in temporary supply chain and makes the management of supply chain imperative in the construction industry [20 . This paper is aimed at studying the systems of relating to suppliers by contractors in Lagos State. If there are factors influencing and affecting these systems of relationship, it is imperative to identify them. This is one of the objectives of this paper; the other objective is to investigate ways of improving Construction Supply Chain management systems in the Nigerian Construction Industry.

Literature Review

Construction Supply Chain Management is described by Vollman et al. [21] as an integrated set of practices for coordinating the entire chain of raw materials to end customer and to offer a collaborative working environment where improved communication and information flow across the day-to-day operation. Love et al. [22] defined it as the network of facilities and activities that provide customer and economic value to the functions of design development, contract management, service and material procurement, material manufacture and delivery, and facilities management. According to O'Brien et al. [14] and Vrijhoef and Koskela [20], Construction Supply Chain Management is an interface management to improve the coordination among chain members for successful execution of site activities; develop integrated management between construction site and industrialization; strengthen the Just-In-Time approach which eliminates the unnecessary site approach, inventory cost and production time in order to achieve the perfect supply chain performance. Supply chain management takes the clients, main contractor and other service providers in a supply chain and develop integration through trust establishment, communications improvement, collaborative engagement and alignment of systems and processes (Ross, 2011 cited in Hope [12]).

The evaluation of the potential benefits and barriers of Construction Supply Chain Management to the Construction Industry was carried out by Syed et al. [17]; the study concluded that Supply Chain Management provides the opportunity for the Construction Industry to reduce cost and time overruns and improve productivity. Barriers of Construction Supply Chain Management in the Construction Industry were found to be poor level of logistical competence, lack of guidance for creating strategic alliances, inability to integrate the

company's internal procedures, strong project focus as well as the attitudes and traditions in the Construction Industry. Polat and Ballard [23] studied the Construction Supply Chains configurations for cut and bent rebar in Turkey. The study identified inaccurate data transfers among project participants, delays and interruptions in information flow as some of the problems of Supply Chain configurations in the Turkish Construction Industry. A set of recommendations such as the introduction of the supply chain management systems were proposed in the study. Jorge et al. [24] carried out case studies of Construction Supply Chain Management on construction sites in Portugal to obtain an understanding of supply chain management systems and their impact on delays. The study produced a methodology to quantify the impact of supply chain delays on the performance of a construction project and showed the implementation importance of measures such as sharing technical information between all actors, choice of standard products, integrated planning to reduce the stakeholders in the production flow and the establishment of trusts.

Benton and McHenry [1] defined Construction Supply Chain Management as the strategic management of information flows, activities, tasks, and processes involving various networks of independent organizations and linkages which produce value that is delivered to the owner in the form of a finished project. They opined that Construction Supply Chain Management has the potential, through information and communication technologies, to overcome some of the fragmentation problems in the construction industry. O'Brien et al. [14] discussed the operational and organizational aspect of supply chain management. Vrijhoef and Koskela [20] explained the roles of Construction Supply Chain Management as the interface between the supply chain and the construction site, the supply chain itself, the transference of activities from construction site to the supply chain and the management integration of the construction site and the supply chain. Also, Hope [12] identified integration as the main element of Construction Supply Chain Management and opined that integration should be approached from the perspective of designers and builders and keeping the supply chain together overtime, from one projects to another. Integration in Construction Supply Chain Management has been explained by Davis and Love (2010) cited in Hope [12] as the building of relationships with multiple tier suppliers by the client and the main contractor in order to act as a unified team that is working towards the realization of better value for the project.

Sonza and Koskela [25] opined that Construction Supply Chain Management can be improved based on set of managerial practices and that qualitative research regarding managerial issues of Construction Supply Chain Management should be deeply developed in the Construction Industry in terms of soft social and conceptual research. Tey et al. [19] reviewed the challenges of Construction Supply Chain and its management in Construction Supply Chain Management in Malaysia and their findings show that complexity and harsh supply chain processes, multi trades supply chain members, inefficiency of information sharing and integration, temporary supply chain networks, competitive nature of supply chain and separation of the design and production phases are some of the challenges of Construction Supply Chain. The study also identified lean construction, partnering and strategic integration of Construction Supply Chain business as Construction Supply Chain Management techniques. Cutting-Decelle et al. [6] reviewed the main approaches to Supply Chain communication and analysed the extent of their application to construction. The study found that Supply Chain can be managed as a communication system with the point of view of the management of the information stored or exchanged giving the different actors of the chain. It was noted that the goal of Construction Supply Chain as applicable to site activities is to reduce costs, especially those relating to logistics, lead-time and inventory; to reduce duration of site activities by ensuring dependable material and labour flows to the site to avoid disruption to the workflow; to basically avoid inferior conditions on site, or to achieve wider concurrency between activities; and optimally to integrate management. The study concluded that lots of improvements still remain to be done in the domain of supply chain management.

The characteristics of Construction Supply Chain as studied by Vrijhoef and Koskela [20] are that, it is a converging supply chain that directs all materials to the construction site where the object is assembled from incoming materials, it is a temporary supply chain that produces one-of construction projects through repeated reconfiguration of project organizations and it is a typical make-to-order supply chain, with every project creating a new product or prototype. In his study of performance analysis and configuration simulation in integrated supply chain network design, Dong [26] categorized supply chain modelling approaches into five

broad classes, namely; supply chain network design method, mixed-integer programming modelling, stochastic programming and robust optimisation methods, heuristic methods and simulation based methods. Serpell and Heredia [18] carried out a survey of 5 companies with a view of obtaining a diagnosis about the current situation of the supply chain in the Chilean Construction Industry. The study identified restrictions that exist in the Construction Supply Chain as the main problems of Construction Supply Chain Management in the Chilean Construction Industry and proposed a generic application methodology for implementing the concepts and principles of Construction Supply Chain Management in Chilean Construction firms. As observed by Construction Excellence [10], the objective of Construction Supply Chain Management is to offer better underlying value to a client through value definition, activities integration, costs management, continuous improvement, and supplier relationships. On the improvement of Construction Supply Chain Management, Xue et al. [2] suggested market mechanism, such as auction and contracting, and coordination flow, including information hub and electronic marketplace as internet-enabled coordination mechanism for improving construction performance and to accelerate the innovations in the Construction industry.

Also, a study was carried out in Australia by Sonja et al. [27], where it was found that contractors' relationships with suppliers were more personal and involve social bonding in the case of smaller firms and more business-like and involve structural bonding in the case of larger firms. Tran and Tookey [28] investigated the use of Construction Supply Chain Management in New Zealand in order to enhance the current understanding of Real Options in Construction Supply Chain and developed a comprehensive theory for the Real Options in New Zealand Construction Supply Chain Management. They observed that there is a lack of a rigorous theoretical Real Options framework pertaining specifically to Construction Supply Chain Management. Jadid and Idrees [29] put forward a framework to implement a geographic information system in Construction Supply Chain Management incorporating web mapping services to enhance the supply chain process as a way of utilizing information technology to facilitate the information flows that are required to manage a supply chain effectively and to achieve the project completion schedule. The system can be used to locate the nearest suppliers when selecting a particular material needed for construction projects.

Studies have covered a large number of Construction Supply Chain Management topics. However, this study aims to investigate the Construction Supply Chain Management practices in the Nigerian Construction Industry. It is clear that Construction Supply Chain Management models and systems have been developed and established by various researchers across the world, but there is still a lack of study regarding Construction Supply Chain Management as a management system in Nigeria.

Method

The research methodology employed was a quantitative study achieved through a structured questionnaire survey. Literature review was initially carried out to grasp the concepts of the study area. The questionnaire was made up of 33 questions and divided into five sections; section one with 6 questions was targeted at obtaining general information on respondents and organizations. Section 2 with 6 questions surveyed the structure of the relationship between contractors and suppliers in the Construction Industry; section 3 comprised of 4 questions was about the effectiveness of the nature of the relationship; and section 4 comprised of 11 questions surveyed the factors militating against effective contractor-supplier relationships, while the last section with 6 questions was on improving contractor-supplier relationships.

A total of 100 questionnaires were administered randomly to selected medium and large-sized construction firms in Lagos State that are registered members of the Federation of Construction Industry of Nigeria (FOCI). The list of these companies was obtained from the publications of the FOCI. 54 of those questionnaires were returned giving a response rate of 54% and making a total of 54 returned questionnaires available for analysis. The data from the questionnaire was analysed by the use of frequency distribution and Relative Importance Index (RII). The RII was calculated as:

$$\text{RII} = \frac{\sum_{ii=1}^{N} ri}{N \times H}$$

Where; ri = rating given by the i^{th} respondents ranging from 1-5

H= highest rating

N= total number of respondents

The analysis of the questionnaire revealed that 1.9% of the respondents possessed P.G.D Certificates, 14.8% possessed H.N.D Certificates, and 51.9% possessed B.Sc. degrees, 29.6% possessed M.Sc. degrees and 1.9% possessed Ph.D. the respondents are all professionals, as 3.7% are members of the Nigerian Institute of Quantity Surveyors, 24.1% are members of the Nigerian Institute of Architects, 55.6% are members of the Nigerian Institute of Building, and 16.7% are members of the Nigerian Society of Engineers. As expected, the respondents also had significant years of experience in the Construction Industry, 27.8% had less than 5 years of experience, 38.9% had between 5-10 years of experience, 29.6% had between 11-15 years of experience, and 3.7% had between 16-20 years of experience.

Results and Discussion

Structure of the relationship between Contractors and Suppliers

Table 1 shows that 33.3% of the respondents often make use of partnering as a system of relating with the suppliers, 24.1% of the respondents had never used partnering, 16.7% of the respondents occasionally use partnering, 14.8% rarely use partnering, while 11.1% most often use partnering. The table reveals also that 63.0% of the respondents most often use personal relationship with the suppliers, 14.8% and 11.1% often and rarely use personal relationship respectively, 3.4% had never use personal relationship with the suppliers, while 7.4% occasionally use personal relationship with their suppliers. For social bonding, 38.9% and 31.5% of the respondents had never used and occasionally use social bonding with their suppliers respectively, while 13.0%, 11.1% and 5.6% rarely use, often use and most often use social bonding with their suppliers respectively. 40.7% had never used structural bonding, 14.8% and 27.8% rarely use and occasionally use structural bonding respectively, while 11.1% and 5.6% often use and most often use the structural bonding system with their suppliers. The table also shows that 11.1% of the respondents had never use contractual relationship with their suppliers, 2.2% rarely use the system and 18.5% occasionally use the system, while 37.0% often use the system and 29.6% most often use contractual system. Also, 40.7% had never used alliance relationship with their suppliers, 13.0% rarely use it, 20.4 occasionally use it, 13.0% often use it and 13.0% most often use alliance relationship with their suppliers. As for joint venture system, 50.0% had never used it, 18.5% rarely use it, 16.7%, 7.4% and 7.4% occasionally, often and most often use it respectively. According to Table 1a (see Appendixes), the RII is 3.0, as the majority of the Construction Supply Chain Management systems were occasionally used except the personal and contractual relationships that were often used. Personal relationship ranked first which means it is the most often used system, while joint venture relationship ranked seventh, meaning that it was most often not used as a supply chain management system.

Table1: Structure of the relationship between contractors and suppliers

s/n	systems of contractors-suppliers relationships	Categories and frequencies				
		Never used	Rarely used	Occasionally used	Often used	Most often used
1	Partnering	24.1%	14.8%	16.7%	33.3%	11.1%
2	Personal/Individual	3.7%	11.1%	7.4%	14.8%	63.0%
3	Social bonding	38.9%	13.0%	31.5%	11.1%	5.6%
4	Structural bonding	40.7%	14.8%	27.8%	11.1%	5.6%
5	Contractual	11.1%	2.2%	18.5%	37.0%	29.6%
6	Alliances	40.7%	13.0%	20.4%	13.0%	13.0%
7	Joint venture	50.0%	18.5%	16.7%	7.4%	7.4%

Nature of the relationship between contractors and suppliers

Table 2 shows the type of contractor-supplier relationship systems that the respondents used on their last project. The table reveals that 9.3% of the respondents used social bonding, 3.8% used structural bonding, 29.6% used contractual relationship, 42.6% used personal relationship, and 1.9% used joint venture relationship, while 13.0% used partnering systems on their last projects respectively. Majority of the respondents used personal relationship with their suppliers on their last projects as shown in Table 2. The factors affecting the choice of contractor-supplier relationship systems were shown in Table 3. The table shows that complexity of a project is the most important factor that determines the choice of supply chain management systems as 29.6% thought it

was the simplicity of a project, 22.2% chose the familiarity of the contractor with the supplier, and 3.7% picked time constraint, 1.9% indicated easy way of achieving project completion, 1.9% also went for the best means of avoiding unproductive activities, 0.0% took contractor's long or short term approach, 1.9% selected construction methodology, while 38.9% indicated the complexity of the project. It is imperative to survey the approach that contractors take in their relationships with the suppliers. Table 4 revealed that most of the contractors take a short-term approach (64.8%) in their relationships with the suppliers as compared with long-term approach.

Table 2: Types of Contractor-Supplier relationships used on last projects

s/n	Contractors-suppliers relationship systems	percentage
1	Social bonding	9.3%
2	Structural bonding	3.8%
3	Contractual relationship	29.6%
4	Personal relationship	42.6%
5	Joint venture	1.9%
6	partnering	13.0%

Table 3: Factors responsible for types of Contractor-Suppliers relationship used by contractors

s/n	factors	percentage
1	Simplicity of the project	29.6%
2	Complexity of the project	38.9%
3	Familiarity with the supplier	22.2%
4	Time constraint	3.7%
5	Easy way of achieving project completion	1.9%
6	The best means of avoiding unproductive activities	1.9%
7	Contractor's long/short-term approach	0%
8	Construction methodology	1.9%

Table 4: Approach contractors take on suppliers

s/n	approach	percentage
1	Long-term approach	35.2%
2	Short-term approach	64.8%

Factors militating against effective Contractor-Suppliers relationship

As shown by Table 5, lack of trust between the contractors and suppliers is the most discouraging factors militating against effective contractors-suppliers relationship as it ranked most with 42.6%. other factors militating against effective contractors-suppliers relationships as shown by table 5 include; the decentralization of the contractors' organization with 29.6% and not discouraging according to the respondents, also not discouraging to the respondents is the inconsistency in the projects' way of working(33.3%), contractors' short-term approach (29.6%), market forces of supply and demand (31.5%) and contractors and suppliers work on different geographical market (38.9%), while another most discouraging factor is the organizations' lack of maturity for long term relations (33.3%) and the least discouraging factor is the nature and size of projects (38.9%). Table 5a (see Appendixes) shows that lack of trust between contractors and suppliers ranked first and has the highest influence on contractors-suppliers relationships, while the nature and size of project ranked eight and has the least influence on contractors-suppliers relationship. The RII of the factors is 3.22 as shown in table 5a.

Table 5: Factors militating against effective Contractors-Suppliers relationships

s/n	Factors affecting effective contractors-suppliers relationships	Categories and frequencies				
		Least discouraging	**Rarely discouraging**	**Not discouraging**	**discouraging**	**Most discouraging**
1	Contractors' decentralized organization	18.5%	11.1%	29.6%	14.8%	25.9%
2	Inconsistency in the projects' way of working	11.1%	9.3%	33.3%	27.8%	18.5%

3	Nature and size of project	38.9%	13.0%	31.5%	11.1%	5.6%
4	Contractors' short-term approach	13.0%	20.4%	29.6%	18.5%	18.5%
5	Organizations' lack of maturity for long term relations	9.3%	13.0%	20.4%	24.1%	33.3%
6	Market forces of demand and supply	7.4%	14.8%	31.5%	20.4%	25.9%
7	Lack of trust for suppliers	5.6%	11.1%	18.5%	22.2%	42.6%
8	Contractors and suppliers work on different geographical market	16.7%	13.0%	38.9%	18.5%	13.0%

Improving Contractors-Suppliers relationship

Table 6 shows the factors that can improve contractors-suppliers relationships according to the respondents. Factors such as long-term relationship between contractors and suppliers (59.3%), emphasis on the benefits of maintaining a permanent set of suppliers (42.6%), employment of skilled professionals who can effectively handle inconsistencies in construction operations (38.9%), specialization in the construction industry (35.2%), partnering with suppliers organizations on construction projects (38.9%), and provision of suppliers list by contractors before the final award of contracts (31.5%) were indicated as most likely to improve contractors-suppliers relationships. The index of relative importance of these factors as shown in table 6a is 3.78 with long-term relationship ranking first and specialization in the construction industry ranking sixth among factors that can improve contractors-suppliers relationships.

Table 6: Improving contractors-suppliers relationships

s/n	**systems of improving contractors-suppliers relationships**	**Categories and frequencies**				
		Least likely to improve	**Rarely likely to improve**	**Not likely to improve**	**likely**	**Most likely**
1	Long-term relationship of contractors to suppliers	5.6%	7.4%	11.1%	16.7%	59.3%
2	Emphasis on the benefits of maintaining a permanent set of suppliers	7.4%	9.3%	18.5%	22.2%	42.6%
3	Employment of skilled professionals who can effectively handle inconsistencies in construction operations	9.3%	7.4%	29.6%	14.8%	38.9%
4	Encouraging specialization in the construction industry	9.3%	16.7%	18.5%	20.4%	35.2%
5	Partnering with suppliers' organization on construction projects	9.3%	5.6%	18.5%	27.8%	38.9%
6	Mandating contractors to provide list of suppliers before final award of the contract.	9.3%	11.1%	16.7%	31.5%	31.5%

Conclusion

This study has provided information on the systems of relating to suppliers by contractors, factors influencing these systems of relationship and ways of improving construction supply chain management systems. The paper revealed that the construction supply chain management systems used by main contractors in Lagos State are; personal relationships, contractual relationships, partnering, alliances and social bonding. It can be concluded from the result of the survey that contractors are being affected by lack of trust between them and the suppliers and lack of maturity for long-term relationships in their efforts to make Contractors-Suppliers relationships effective. This was evident from the survey, where 42.6% of respondents indicated that they are affected by lack of trust between them and their suppliers and 33.3% of respondents indicated that they are affected by organization's lack of maturity for long-term relationships.

The results of the survey also revealed that contractors relate with suppliers on short-term basis, this was evident from the survey where 64.8% of respondents indicated that they are using short-term approach in their relationships with suppliers. Although, long-term approach was recommended as the best approach to establishing trust with a supplier, since a contractor can have quality, time and cost control leading to an increased productivity and profitability when the suppliers are trustworthy [13, 30].

Finally, it can be concluded that most contractors have personal relationship with their suppliers and choose supply chain management systems based on complexity of the project, simplicity of the project, and familiarity with the supplier. A long-term relationship between contractors and suppliers will lead to the establishment of long-term project goals to aid construction supply chain management and improve efficiency of contractors-suppliers relationships. Also, specialization should be encouraged in the construction industry, emphasis should be laid on the benefits of maintaining long-term relationship by the contractors with the suppliers, skilled professionals who can effectively handle inconsistencies in construction operations should be employed, and contractors should be mandated to provide list of suppliers before final award of the contract.

Appendixes

Table 1a: Relative importance index of the structure of supply chain relationship

s/n	Types of contractors-suppliers relationships	Rating and weighted factors					SMW	MWV	RECΔi	Ranking
		NU 1	RU 2	OU 3	OU 4	MU 5				
1	partnering	13	8	9	18	6	158	2.93	-0.07	3
2	personal	2	6	4	8	34	228	4.22	1.22	1
3	Social bonding	21	7	17	6	3	125	2.32	-0.68	5
4	Structural bonding	22	8	15	6	3	122	2.26	-0.74	6
5	contractual	6	2	10	20	16	200	3.70	0.70	2
6	alliances	22	7	11	7	7	132	2.44	-0.56	4
7	Joint venture	27	10	9	4	4	110	2.04	-0.96	7
		∑MWV/Y = 3.0								

Table 5a: Relative importance index of factors militating against effective contractors-suppliers relationships

s/n	Factors affecting contractors-suppliers relationships	Rating and weighted factors					SMW	MWV	RECΔi	Ranking
		LD 1	RD 2	ND 3	D 4	MD 5				
1	Contractors' decentralized organization	10	6	16	8	14	172	3.19	-0.03	4
2	Inconsistency in the projects' way of working	6	5	18	15	10	180	3.33	0.11	3
3	Nature and size of project	21	7	17	6	3	125	2.32	-0.90	8
4	Contractors' short-term approach	7	11	16	10	10	167	3.09	-0.13	5
5	Organizations' lack of maturity for long term relations	5	7	11	13	18	194	3.59	0.37	2
6	Market forces of demand and supply	4	8	17	11	14	185	3.43	0.21	4

7	Lack of trust for suppliers	3	6	10	12	23	208	3.85	0.53	1
8	Contractors and suppliers work on different geographical market	9	7	21	10	7	161	2.98	-0.24	6

∑MWV/Y = 3.22

Table 6a: Relative importance index of factors that can improve contractors-suppliers relationships

s/n	**Factors that can improve contractors-suppliers relationships**	**Rating and weighted factors** LL 1	RL 2	NL 3	L 4	ML 5	**SMW**	**MWV**	**REC Δi**	**Ranking**
1	Long-term relationship of contractors to suppliers	3	4	6	9	32	225	4.17	0.35	1
2	Emphasis on the benefits of maintaining a permanent set of suppliers	4	5	10	12	23	207	3.83	0.05	2
3	Employment of skilled professionals who can handle inconsistencies in construction operations	5	4	16	8	21	198	3.67	-0.11	4
4	Specialization in the construction industry	5	9	10	11	19	192	3.55	-0.23	6
5	Partnering with suppliers' organizations on projects	5	3	10	15	21	206	3.82	0.04	3
6	Contractors should be mandated to provide list of suppliers before final award of the contract	5	6	9	17	17	197	3.65	-0.13	5

∑MWV/Y = 3.78

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