

Conceptualizing Supply Chain Cost Management as a Construct for Managing Construction Contractors Profitability

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Abstract:

The purpose of this paper is to conceptualize construction supply chain cost management (CSCCM) as construct for managing the profitability of contractors. The said construct CSCCM is coined by synthesizing the twin concept of supply chain management (SCM) and cost management (CM) and identify practices for it implementation by contractors. The conceptualization of the construct is achieved through a well-structured literature review of concepts and sub-concepts associated with SCM and CM leading to the introduction of a novel definition for SCCM, which the authors view as the strategic management of cost-related activities through estimating, cost budgeting and control across inter-organizational boundaries along the supply chain. A conceptual framework for deploying SCCM as project profitability management tool for contractors was introduced. The research provides a basis for improving contractor's project profitability in Nigeria.

Keywords:Supply chain management, Cost management and Supply chain cost management

1.0 Introduction

Construction contractors or firms are one of the major stakeholders of the construction industry. Using management, manpower, machine and money, they translate construction blueprints into buildings and other constructed assets which are needed for the functioning of modern society. The sustainability of construction contracting businesses is largely dependent on the ability of the firms to deliver projects profitably. Delivering projects profitably requires that contractors put in place a system for managing project profitability.

Profitability management is a systematic approach that seeks to maximize revenue (turnover) and minimize costs. White (2008) described profitability management as consisting of a set of processes and methodology to bring cost and revenue together on an operational level, providing operational managers with the insight on how to deploy resources in an optimal way.

Unfortunately, anecdotal evidence suggests that many of the contracting firms in Nigeria do not have in place a project profitability management system that captures the different components and interrelationships among the components that influence project profitability. The fallout from this, as reported in the literature include poor quality of work (Idoro, 2007), low productivity (Adenikinju, 2005), project abandonment (Mauzu and Bustain, 2014), insolvency (Ekundayo, Jewel and Awodele, 2013).

Therefore, there is an urgent need to address the problem of poor project profitability of construction contractors.

Past studies (Securing, 2002;;Taggant, Koskela and Rookie, 2014;Virjhoef and Koskela, 2000) established that employing effective and appropriate supply chain management could reduce construction cost and improve contractors profitability (Khutale and Kulkami, 2013). Same has also been reported about effective cost management implementation (Obi, Arif and Kulonda, 2017; Sawalhi and Enshassi, 2004). However, rare attempts have explored the integration of the concept of supply chain management and cost management in improving project profitability of construction contractors.

It is in the light of the foregoing,that this study seeks to fill the gap in the literature by conceptualizing construction supply chain cost management as a construct for managing the profitability of construction contractors in Nigeria with a view to establishkey concepts, operational definition and framework for its implementation.

2.0 Methodology

In order to achieve the aim of this paper a scholarly literature review was performed in order to understand concepts like supply chain management (SCM), construction supply chain management (CSCM), supply chain relationships and cost management in constructionusing the leading construction journals that are housed in publisher’s databases or indexed by Emerald, SCOPUS, Taylor and Francis, JSTOR, Elsevier, and Springer.The journals considered include;

- a. International journal of construction management
- b. Journal of construction engineering and management
- c. International journal of production research
- d. International journal of project management
- e. Production planning and economics journal
- f. Construction managent and economics journal
- g. Engineering construction and architectural management
- h. Journal of construction engineering and management.

Articles published from 2002 to 2019 were collected for this study. To achieve the aim; the keywords chosen for the paper searches are: supply chain management (SCM), construction supply chain management, supply chain relationships, cost management and supply chain cost management (SCCM).

After the first search from 2009 to 2019 a total number of 20 journal articles were found from the above listed databases within the last 10 years. Since the journal articles were few, another systematic search/review was conducted from 2002 to 2008 in order to gather significant scholarly literature journal articles for the study.The search was useful, as we could explore all the recentarticles of concepts and sub-conceptsassociated with SCM and cost management application in the construction industry.

The analysis was based on the content of the documents aimed at identifying all constructs, concepts and variables as applied in construction supply chain cost management (CSCCM)

3.0 Literature Review

3.1 Understanding Contractors Profitability

Profitability is the firm’s ability to continuously generate net income from its operation (Toshniwal, 2016). It is the ability of a company to use its resources to generate revenue in excess of its expenses. It is determined by matching revenue and cost associated in generating that revenue. The two key aspects of profitability are revenue and expenses. Revenue is the income generated from normal business operations

while expenses are the cost of operations that a company incurred to generate revenue. Profits it can be defined as the money the project makes after accounting for all costs and expenses. Profit is determined subsequently, after deducting all expenses from turnover. Turnover in turn refers to the number of times the company earns revenue using the assets it has purchased or generated in the business. In the construction industry; turnover has to do with the frequency or how quickly a contracting company receives, gets and earn revenue (income) on executed projects over a period of time. A company's turnover, therefore, is the revenue generated by the company at the end of a given period. To increase profit on a job, turnover must be increased while expenses associated with the project must be minimized. The higher the turnover of projects, and the lower the expenses incurred on the project, the greater the profitability of a company. This relationship is captured below:

Project profitability = Project turnover – Project expenses.

.In order to achieve high level of turnover, many things must be considered by the company in the operation of the company itself. Among them are good relationships management with the clients (developers, government, individual, and corporate bodies) and high level of competence and capability in the form of delivering projects on time, quality and time to meet client satisfaction. Reducing expenses will require that the contractor give attention to relationship with subcontractors and suppliers. The supply chain management construct is related to this.

3.2 Contractor's supply chain expenses on projects

Project expenses are all cost incurred in executing and delivering a project to generate revenue. This cost could be direct or indirect, direct construction costs are all costs that can be specifically attributed to an activity in a project. Direct cost consists of the cost of materials, labor, equipment and subcontractors needed to carry out a specific, well-defined item of work. Indirect costs are costs that are not specifically allocable to construction contracts and constitute a significant portion of the total construction cost and may vary between 7.5% and 35% of the total cost (Chitkara, 2009). A category of indirect cost is labeled transaction cost in transaction cost economics. Transaction costs are all of the costs associated with the conducting of exchange between firms. Transaction cost is a friction cost of working among companies and suppliers and can be divided into ex ante transaction costs (search and contracting costs), and ex post contracting costs (monitoring and enforcement costs). Search costs include the costs of locating a desirable trading partner (subcontractor, supplier) and then negotiating and writing a mutually acceptable contract. Monitoring and enforcement costs refer to the costs associated with monitoring (subcontractor, supplier) the contract implementation and the procedures necessary to ensure that each party fulfills the predetermined set of obligations in the contracts.

The relationships a contractor has with the client as well as with the subcontractors and suppliers affects the expenses incurred by the contractor as he conducts his business. It is on this note that this work seeks to integrate the concept of supply chain management with traditional cost management to coin the supply chain cost management construct as a profitability management tool for Nigerian indigenous contractors.

3.3.0 Deconstructing Construction Supply Chain Cost Management (CSCCM).

Construction supply chain cost management is a construct comprising of supply chain management and cost management concepts. In an attempt to conceptualize construction supply chain cost management (CSCCM), the concepts underpinning the construct shall be described.

3.3.1 Construction Supply Chain Management

Supply chain management (CSCM) is a relatively new concept in construction, originating from the manufacturing industry. It is a subject of intense research in the manufacturing discipline since the 1960s.

The concept of SCM in the construction industry defies a widely acceptable definition in the literature. Xue et al (2007) describe SCM as "the network of multiple organizations and relationships, which includes the flow of information, the flow of materials, services or products, and the flow of funds between client, designer, contractor and supplier". Christopher (2005) defined supply chain management as the management process of the relationships between different customers and suppliers to deliver better value at less cost to the supply chain as a whole. Construction supply chain management involves the strategic and process coordination of subcontractors, material suppliers, and information within the supply chain to deliver satisfaction to the ultimate project owner (Khutale and Kulkarni, 2013). Handfield and Nichols, (2002) argued that SCM must achieve sustainability and competitive advantage. It can be said that sustainability of CSCM and competitive advantage is a key concept theme of CSCM.

Drawing from the definitions from various researchers in the CSCM literatures, the authors present a most succinct definition which is appropriate for this study's context. The authors presents CSCM as the strategic management and integration of interdependent organization (downstream & upstream) that provides value and satisfaction to the end-user and other key stakeholders in the form of construction project to the function of design development, knowledge and information transfer, material procurement flow, plant and equipment flow, financial and improve relationship to achieve profit maximization, sustainability and competitive advantage.

According to Securing (2002) definition of supply chain management include two aspects; the management of materials, plants, information flow and the management of relationships along the supply chain. The interconnected links of material and information flows along the supply chain can only be achieved by managing relationships amongst supply chain actors. Therefore, supply chain relationship management is an integral concept of supply chain management.

3.3.2 Supply chain relationship management.

A collaborative relationship that is built on trust and commitment could reduce transaction cost which reduces the contractors total supply chain expenses ((Kwon, Hamiton, Hong, 2015). Khalfan, Kasyap and Abbott, 2010) argued that good relationships between construction partner may lead to process and product improvements by sharing knowledge among the supply chain partners, reduced cost as a result of centralized communication or increase profits by centralized knowledge as a source of competitive advantage to win new or gain repeat business.

Researchers have argued that good relationship management amongst construction stakeholders could lower construction cost, improve quality, enhance competitive position, reduce rework, reduce construction time and increase the overall profit of the contractor (Faisol, Dainty, and price, 2006). Bresnen and Mashall (2000) highlighted number of benefits derived from collaborative relationship amongst construction stakeholders;

- a. delivers lower building cost for the client and higher profits for the contractor;
- b. improves the chances of capturing clients' requirements (brief) and their eventual satisfaction;
- c. recognizes and protects the main contractors' profit margin, making them better able to deliver on the quality requirements of projects;
- d. increases value and predictability of work;
- e. reduces the number and severity of contractual disputes;
- f. creates an enabling environment for innovation and technical development;
- g. encourages continuous improvements;
- h. Results in shorter overall project time

It is evident from the foregoing that a contractor that seeks to reduce expenses will need to build quality relationship with to category of stakeholders, namely the client, subcontractor and the supplier.

3.3.2.1 Contractor's Relationship with Client

The client is the initiator and financier of the construction projects. The client can be categorized according to Kelly, (2015) as: commercial (company, factories etc.), individuals, government and Public Limited Companies (Banks, Developers etc.). These clients engage contractors to successfully deliver the project. Researches in the construction literatures have considered Client-main contractor relationship as the main relationship in a construction supply chain (Meng, 2012; Cox et al., 2006). The sustainability of contractor's business is largely dependent on its clients. Therefore, it is necessary for business organizations to maintain healthy relationship with their clients (Ojelabi et al 2018).

Studies conducted by Baiden, Agyekum and Atuahene, (2018) revealed that contractors execution of work to client expectation increases the satisfaction level of the client and this in the long run creates positive connection between parties. This could potentially lead the contractor to gaining more contracts based on repeat business and client's recommendation to other client's. Jagtap and Kamble, (2019) posited that good relationship between contractor and clients provide the platform for the client organization to whirl the reward power mechanism by offering bonuses, incentives and repeat businesses to keep the contractor who remain committed to project performance. A contractor's good relationship with a client improves turnover in two ways. First it increases the frequency with which a contractor is used by the client and members of the client network, Secondly, contractors who have built transformational relationships with their clients can charge a premium for their services. To this end, this work lists contractor's client relationship management as one of the factors that make up supply chain cost management.

3.3.2.2 Contractor's relationship with subcontractors and suppliers (complementors)

Main contractors are responsible for the construction of projects, but they rely on subcontractors and/or specialist contractors and suppliers to execute the works (Clarke and Herrmann, 2004). They do this to reduce their overhead and operating costs, improve efficiency, and achieve more economic delivery of projects which Hatmoko and Scott (2010) believe has helped reduce project delays by 45%. However, to be successful at this, they must develop enduring relationships with key suppliers and specialist contractors (Pheng and Chuan, 2001).

It should be noted that a good relationship between main contractors and subcontractors has been considered to be a great strategic asset for both of them (Kale and Arditi, 2001). According to Chenault, (2019) no two subcontractors are made the same, they have unique talents and capabilities within the industry. He argued that contractors, who maintain relationship with larger pool of subcontractors to select for jobs, reduce cost and in return a better finished product. According to Chenault, (2019) with higher reputation, more developers (clients) will seek the contractor for more jobs (repeat business). He further argued that not only will the contractor get more business turnover, but it would lead to more subcontractors wanting to work with the contractor.

Maintaining good relations with a supplier should be as important to a contract administrator/end user as getting the best price. A supplier who is treated with courtesy, honesty, and fairness will deliver a quality product at the best price, will provide good service, and will be responsive to emergency situations and special request (Waithaka and Waiganjo, 2015). Contractor's relationship management with subcontractors and supplier is therefore listed in this work as another management practice underpinning supply chain cost management. While it is true that long term relationships with suppliers could reduce supply chain expenses, it has also been argued that it could be exploited by suppliers and subcontractors. To prevent

such exploitation, a cooperative relationship building strategy should be part of the relationship management practices.

3.3.2.3 Cooperative Relationship

Coopetition can be defined as a process based on simultaneous and mutual cooperative and competitive interaction between two or more parties (Dorn, Schweiger, and Albers, 2016). Competing and collaborating with competitors at the same time (coopetition) has proved to be an effective strategy for contracting firms in developing countries (Feela, 2020). Cygler, solesvik and Debkowska, (2018) based on their empirical studies highlighted key benefits of coopetition to contracting organization such as access to resources, reduction of cost and the strengthening of one position against competitors, gaining unique knowledge and increase innovation. It is also suggested that coopetition among contracting firms may have a positive impact on profits (Powell, White, Koput and Owen, 2005).

3.3.3 Cost management

Cost management techniques center on the contractor's unit of assessment. Ashworth (2010) defined cost management as the process of planning, estimating, coordinating, controlling and reporting of all cost-related aspects of a project to ensure delivery within approved budget. According to PMBOK guidelines (2004), the project cost management process includes the sub processes involved in planning, estimating, budgeting and controlling costs so that the project can be completed within the approved budget. But, it identified cost estimating, cost budgeting and cost controlling as the main and discrete processes of a cost management system

Estimating is a process which is used to predict the cost of undertaking a construction work. This process is one whereby a contractor can produce a detailed estimate of the cost of carrying out a construction project by taking into account the cost of labor, materials, equipment and finance, together with the cost of sub-contract work, overheads and profit. The process of cost estimating is very important as it enables contractors to determine what their direct costs will be and to provide a bottom line cost below which it would not be economical for them to carry out the works.

Budgeting is an essential part of the process as it provides a system for monitoring costs (Ashworth, 2010). Cost budgeting, in projects, involves aggregating the estimated costs of individual schedule activities or work packages to establish a total cost base line for measuring project performance (PMBOK guidelines, 2004). In general, the project budget integrates monetary objectives, responsibilities and allocated resources. The base of the budget is the project plan and the schedule of work.

Contractors who execute contracted works bear the cost of input resources and site expenses which include the cost of labor, materials, machinery and capital. All these expenses need to be controlled and monitored by the contractor in order to make adequate profits and not suffer losses on executed projects. The control stage is used for monitoring performance against the set plans.

Contractors have a lot of financial obligations to meet such as interest on loans, statutory payments, insurance, and depreciation and so on. According to Loosemore (2004) based on contractor's perspective; cost control is all about measuring to track construction cost and report on cost performance. In cost control, the construction cost of the project is managed through the best methods and techniques so that the contractor does not suffer losses when carrying out the activities of the project

3.3.4 Contractor Capability

Capability refers to the extent in which companies are organized to achieve the set goal that is relevant to the successful project outcome and their competitive advantage and sustainability (Salaman and Asch 2003). It is essential for contracting firms to develop good management capabilities to execute and ensure successful

completion of project objectives. Management capability is the ability of contractors to effectively utilize resources and expertise to deliver projects to time, within cost and to the required quality (Aje, Odusami and Ogunsemi, 2009)

According to Wong and Holt (2003), the following should be considered under contractors' management capability: type of control and monitoring procedures, ability of the contractor to deal with unanticipated problems, i.e. risk management, provision of trained/skilled supervisors for the proposed project and the contractors' information technology knowledge, and e.g. project management software and electronic document management system. It includes; capacity to manage subcontractors and relationships amongst supply chain partners. General contractors, not only subcontractors, must manage the relationship with various stakeholders including customers, creditors, designers and suppliers (Yang, Shen, Drew and Ho, 2010). Contractor performance and capability lead to increase client satisfaction, an improvement in the reputation of contractor and their competitiveness, and repeat of business in the construction market ((Ogunsemi and Jagboro, 2006).

3.4 Conceptual Definition of Construction Supply Chain Cost Management (CSCCM)

Based on the analysis of construction supply chain management and cost management from leading journals in the Architecture, Engineering and Construction (AEC) literature, the researcher conceptualizes construction supply chain cost management as thus: Construction Supply Chain Cost Management (CSCCM) is the strategic management of cost related activities through estimating, cost budgeting and control across inter-organizational boundaries along the supply chain to the function of knowledge and information transfer, material, equipment and financial flow through an improved relationships in order to add value to the customer/client and other key stakeholders in achieving profit maximization, sustainability and competitive advantage

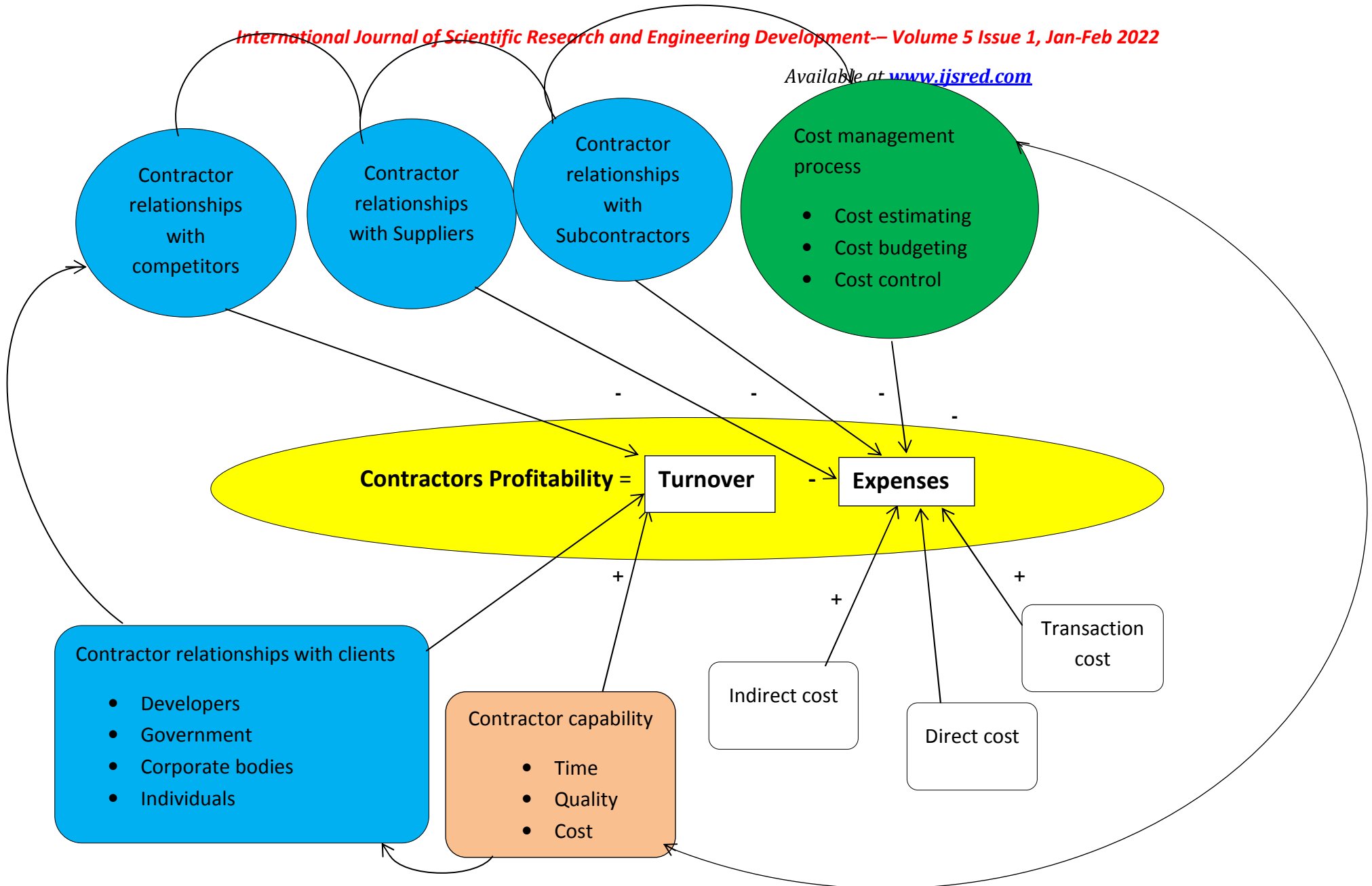


Figure 1: Conceptual Framework

Source: Researcher

4.0 Conclusions

The study conceptualizes SCCM for managing the profitability of construction contractors. Detailed literature review was conducted on concepts and sub-concepts of supply chain management and cost management that frames up SCCM as a construct. The major concept of supply chain management is relationship management across project stakeholders in delivering construction projects. Good and long term relationship management could prove to be a strategic asset to the contractor in reducing project expenses and enhancing project turnover. Cost management will have to form an integrative part of supply chain in all stages of the project delivery.

The project profitability management practices with influencing factors was segmented into cost management-reducing expenses, turnover-enhancing relationship with client(s), expenses-reducing relationship management with subcontractors and suppliers (complementors), cooperative relationship building and capability that increase turnover. The article offer two significant theoretical contributions; firstly, identification of concepts and sub-concepts for supply chain cost management in the context of managing contractor's project profitability and proposed a conceptual definition of SCCM. Secondly, we develop a conceptual framework for contractor SCCM implementation.

Beyond that, further development of long term relationship that is based on trust and confidence within the supply chain coordinated by the contractor will be necessary in managing cost and improving the project profitability of contractors.

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