Potential Brokerages in Relationally Integrated Value Networks (RIVANS) for Total Facilities Management: Literature Findings

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Abstract

The collaborative supply chain networks in relational contracting modes have gained considerable attentions in recent decades as an essential prerequisite for enhancing business performance. Accordingly, integration of Project Management (PM) and Facilities Management (FM) phases of facility lifecycle through a collaborative network of stakeholders has been recommended as value additional strategy for the built environment professionals. Such value networks are called relationally integrated value networks (RIVANS) that operate extending PM and FM towards Total Facilities Management (TFM). TFM involves effective transferring of information, material, and services between PM and FM phases while sharing common goals among all stakeholders in entire life cycle of a facility. However, weak integrations among stakeholders have identified as one of the greatest barriers to form RIVANS between stakeholders in both phases and hence poor performances during FM phase are experienced. TFM provides a holistic approach through RIVANS to bridge the PM phase and the FM phase in the lifecycle of facilities as a favourable approach. Therefore, this paper aims to integrate these two phases through RIVANS by linking stakeholder of both phases. Study found that there are problematic "structural holes" that exist in these networks, which impeded the flow of information, material, and services and are short term oriented. Long term oriented value network appears to be favorable in facilities lifecycle to bridge the two phases through a common set of goals. Hence, the paper concluded that there is a brokerage potential of client's facilities manager and project manager to bridge two network structures while strengthening structural holes. The brokers help to transfer material, information, and service between different stakeholders while enhancing better value through common goals.

Keywords: *Integration, Facilities Management, Value Networks, Brokerages*

1.0 Introduction

Facilities Management (FM) has become recently emerged significant proponent in the built environment as a profession by which facility could effectively support efficient and effective service delivery throughout its life cycle. Barrett and Baldry (2003) defined Facilities Management as an integrated approach of maintaining, improving, and adapting the buildings of an organisation in order to create an environment that strongly supports the primary objectives of the organisation. Thus, FM is concerned with providing satisfactory levels of services that have been agreed with customers in the most cost-effective way for present and future outcomes (Lepkova, and Zukaite-Jefimoviene, 2012). However, effective service delivery depends on the magnitude of the decision making taken placed at the project planning and developing phase of the building life cycle, towards providing expected levels of service (Ling et al, 2014). In this regards, interrelationship between FM phase and Project Management (PM) phase has identified as an essential requirement for delivering continuous and satisfactory services to the occupants. As such, most of the researchers also have mentioned that considerations for FM should initiate right from the PM phase (De Silva et al, 2014).

Traditionally, supply chains in PM and FM have been operated as independent chains, with minimal collaboration with one another (Kumaraswamy et al., 2012). These two phases involve with number of stakeholders who participate in two different supply chain networks with different motives. Kumaraswamy et al. (2004) further highlighted that interaction and communication between these two phases are usually limited in traditional procurement approaches where transactional force are very limited, resulting in weak collaborative supply chain networks. Therefore, managing client requirement becomes a complex process which is crucial to the successful delivery of construction projects. However, creating relational value networks (RIVANS) by integrating these supply chain networks is a key drive towards achieving Total Facilities Management (TFM) to satisfy the client need. Famakin et al. (2012) highlighted that value networks with common values shared among project stakeholders that focusing on optimising relational

integration, generate synergies Moreover, it has become increasingly important for PM and FM stakeholder to maintain long term interaction due to the needs of client/occupant/owner (De Silva et al, 2014).

PM stakeholders may require to link with the FM stakeholder as a holistic approach for facility life cycle through common goals in delivering efficient services to end users. Further involvement of a broker between stakeholders could be supported to reinforce the links between weak relational contracts. Hence, this paper structured to investigates the relationally integrated contracts between FM and PM stakeholders and identify potential brokerages that exist in these networks to create strong collaboration, which impeded the flow of material, information, and services.

The paper aim is to develop a common network by linking the stakeholders in PM phase and FM phase supply chains by conducting a literature survey. Firstly, paper addressed the concept of RIVANS and potential brokerage theory. Collaborative networks in PM and FM for brokerage potentials are discussed and further collaborative network in TFM is proposed with the brokerage potentials.

2.0 Research Methodology

The objective of this paper is to develop a hypothetical relationally integrated value network, expanding over PM and FM using a literature survey. Aiming that, it is required to establish potential brokerage in PM and FM value networks. Therefore more than 70 journal papers published during 2000 to 2013 were reviewed to investigate the theoretical scenarios for RIVANS. Those papers were mainly from five journals (Table 1).

Table 1: Journal Articles

Journal Name	No of papers
Facilities	20
Journal of facilities management	25
Supply chain management: an international journal	10
Engineering, construction, and architectural management	12
Journal of financial management of property and construction	8

In addition, conference papers, published books and other related journal articles were reviewed to attain the objective of the study.

3.0 Literature Findings

3.1 Relationally Integrated Value Networks (RIVANS)

Interaction and communication between PM and FM phases are usually limited in the traditional procurement approaches. Therefore, unrealistic expectations, incomplete requirements, insufficient resources/schedule, lack of management support, poor planning, changing requirements, and lack of users' involvement were highlighted as common problems in maintenance of built facility (Yu and Shen, 2013). Further, with the increased attention on customer satisfaction, sustainable buildings, life cycle cost, flexible designs, designing and constructing for maintainability, interaction and working relationship between PM and FM has become increasingly important (Ling et al, 2014). Therefore, Kumaraswamy et al., (2010) proposed RIVANS as a solution for a holistic conceptual framework for "relational integration," where stakeholders are engaged in cross-linked value networks which extend beyond the typical structural integration approaches such as in procurement modes like design – build or design build-operate. RIVANS identifies better values of the entire stakeholders/network (including the client, consultants, contractors and suppliers in the supply chain), and build better relationships, mostly by jointly focusing on, and working towards such common shared goals. RIVANS can be seen as a viable vehicle to mobilize for addressing persisting shortfalls in achieving overall value through encouraged increased focus on the collaborative elements of design and construction (DC) of project management (PM) phase and FM phase (operation and maintenance) of facility. However, the diverse nature of participants with different backgrounds, expertise, and values can lead to difficulties in achieving an integrated collection of creativity, shared understanding, and common goals (Sebastian, 2007; Emmitt, 2007). Further, both phases are fragmented and hence, only short term oriented relationships are existed.

3.2 Brokerage Potentials in value networks

The social capital was originally used to describe the relational resources, embedded in cross-cutting personal ties. Later research has applied the concept to a broader range of social phenomena, including relations within and beyond the firm (Tsai and Ghoshal, 1998). For long there have been two approaches to social capital (Vlies and Maas, 2009):

(i) The network closure approach focuses on the density of the network,
(ii) The structural holes approach focuses on the gaps between several dense networks

In particular, Burt's theory of structural holes views that organizations are not remain just in terms of the tight connections within their social structures, but also in terms of the "holes" where connections have failed to form. Such holes provide opportunities for socially entrepreneurial individuals to play bridging roles in the organization, linking to disparate people or groups who are otherwise not interacting with each other. The argument is that individuals whose connections bridge such holes tend to do particularly well professionally, and this argument has been supported by empirical studies of managers in large corporations, correlating an individual's success with this type of bridging activity (Burt, 1992). However, structural holes disrupt the flow of valuable information in a project which provides opportunities to those who can re-make (broker) those connections to achieve a smooth flow of information, material, and services (Burt, 1992, Kuratko et al., 1990). Therefore, by spanning structural holes brokers can perform an "intrapreneurial" role within and FM and PM phase, by leveraging social capital from the new non-redundant connections between FM and PM phases of the facility. The strategy guided by brokerage involves locating a position at the edge of two groups, and building relations between dissimilar people (Burt, 2000).

For example, if a broker sits between two other actors and controls the flow of information between them, then they are in a powerful position. Baker and Obstfeld (1999) argued that brokers tend to employ two distinct types of strategies in reconnecting organisations: "disunion" and "union" strategies. In the disunion strategy, the broker pursues the active separation of disconnected actors therefore becoming a bridge between two disconnected actors but not allowing them to interact directly. Conversely, in the union strategy, a broker closes the network holes between two disconnected actors enabling them to communicate directly or through a common third party. In reality, a combination of both approaches tends to be adopted. However, paper attempts to address the brokerage potentials in TFM by connecting stakeholders in both PM and FM phases.

3.3 Collaborative Network in PM and Brokerage Potentials

The construction industry characterised with high fragmentation, conflicts and disputes compare to other industries (Dainty, Millett, and Briscoe, 2001). Hence, coordination and cooperation is frequently practiced in construction industry through formal supply chains or other relational contracts. Further, there are some lasting networks in the construction industry to fulfill their end objectives. From a social capital perspective, the construction industry is a large sector with little network closure and many structural holes. The lack of network closure results in the short-term orientation. Further, fragmentation and project based contacts result in many structural holes (Vlies and Maas, 2009).
In general, there was a preference for less structured or informal partnerships and loose alliances that were not moderated or prescribed by formal contractual arrangements in construction industry (Briscoe and Dainty, 2005). Construction supply chain on larger projects typically involves hundreds of different companies supplying materials, components and a wide range of construction services (Dainty, Millett, and Briscoe, 2001). There are three types of CSC: the primary supply chain, which delivers the materials that are incorporated into the final construction products; the support chain, which provides equipment and materials that facilitate construction, and the human resource supply chain which involves the supply of labor (Muya, Price and Thorpe, 1999). According to the Xue et al (2007), construction supply chain consists of all the construction business processes, from the demands by the client, conceptual, design and construction to maintenance, replacement and eventual decommission of building, and organisations, which are involved in the construction process, such as client/owner, designer, general contractor (GC), subcontractor, supplier, consultant, etc.

A typical construction supply network has main contractor at centre of the hub, with links to the client, main supply agencies and to the both design and any specialist management service, all of which are provided externally (Dainty, Millett, and Briscoe, 2001). According to the Xue, et al, (2005) construction supply chain involves key members of construction supply chain, including client/owner, designer, contractor, subcontractor, and supplier which presents in Figure 1.

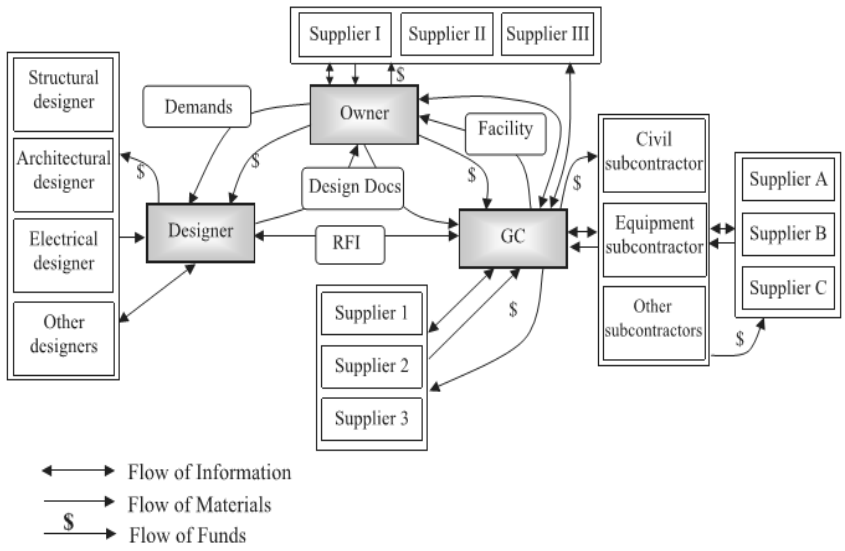

Figure 5: A typical Construction Supply Chain (Source: Xue, et al, 2005)

Flow of material, information, and funds between various stakeholders in construction industry illustrates in Figure 1. Contributions of different stakeholders including clients, architects, consultants, contractors, and planners can make a long been recognised project. Further, Xue et al (2007) showed the different communication transferring efficiency in construction supply chain (refer Figure 2).

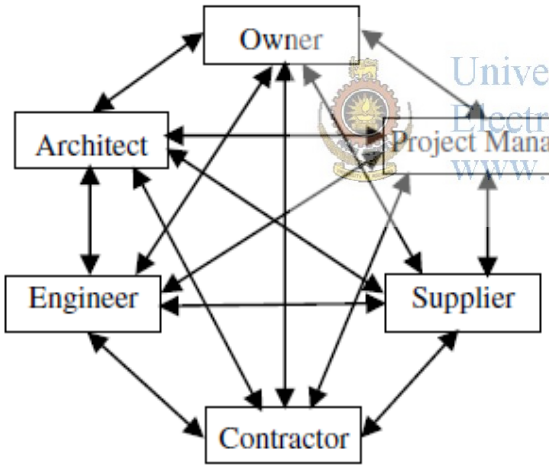

Figure 6: Communication in CSC (Source: Xue, et al, 2007)

Accordingly, there are various types of relationships or interactions between PM stakeholders. Most long-term relationships were formed only with principal contractors and clients who were reluctant to fully engage with subcontractors and suppliers (Briscoe and Dainty, 2005). Nobbs (1993) mentioned that the contribution of sub-contractors to the total construction process can account for as much as 90 per cent of the total value of a construction project. But, most work undertaken in construction partnering has been largely main contractor-client based, with little or no mention of adopting partnering with subcontractors (Matthews et al, 2000). The main contractors were usually left to forge their own relationships with the subcontractors and, often appeared to be insufficient trust to allow any formal partnering of an enduring nature (Briscoe and Dainty, 2005). According to Briscoe et al, (2001), main contractors frequently changed suppliers, often failed to share strategic information, provided some poor feedback to these suppliers, and commonly made late payments. Similar problems were observed in a study by Thorpe et al (2003) where supposedly "preferred" subcontractors were disadvantaged by some supply chain practices.

Further, prime contractors increasingly depend on their suppliers, both for realizing projects and for achieving required performance in the projects. This increasing dependence on the prime contractors provides opportunities for contractor-supplier cooperation and emphasizes the importance and significance of managing suppliers (Voordijk and Vos, 2012). According to the Xue et al (2007), there are no direct relationships between owner-subcontractor, owner-supplier, designer-subcontractor, and designer-supplier. Ceric (2010), mentioned that project owner, contractor, and their project managers play key roles in all construction projects. Moreover, project managers, involved in construction projects are typically professionals concerned with a wide variety of construction-related disciplines.

Moreover, different types of client-design consultant relationships are delineated. According to the Margaret et al (1993), relationships that span a number of years entail a high degree of rapport between client and design consultant that are particularly beneficial. Long-term relationships enable design professionals to gain a deep understanding of the client's business and engender mutual respect and trust between the client and design professional, which facilitates the

creation of effective design solutions. Siva and London, (2012) further stated that architect and client relationship allows to understand the culture and norms of the new environment for both parties which would create better confidence in project continuation.

Further, findings of the Xie et al (2010) showed that project manager, lead quantity surveyor (QS), are the central actors in the communication network, and are well connected to the rest of the project team, demonstrating an important role in the project initially. Thereafter, the design coordinator from the architect side becomes the central actor in design phases and design team members have moved towards the centre and the QS away from the central role to manage the construction process (Xie et al, 2010).

Humphreys, Mathews, and Kumaraswamy, (2003) described, main contractor to establish qualified partners with subcontractors that yields to all the agents in the supply network and produces significant improvements in collaborative working. Wan and Kumaraswamy, (2012) revealed poor coordination and frequent design changes and/or errors at the pre-installation stage of building services projects could be solved adopting intra-inter dependent teamwork concept. Further authors mentioned to establish the post of building service coordination facilitator who is responsible for overall planning, controlling, and coordination of the design and construction teams to ensure that decisions are made in the best interests of the project. Thereby, the service coordination facilitator can be act as the project manager at the design and construction phase of a facility.

The literature review identified various studies exploring client-designer relationships, project manager-design team relationships and architect-client relationships. However, the diverse nature of participants with different backgrounds, expertise, and values can lead to difficulties in achieving an integrated collection of creativity, shared understanding, and common goals (Sebastian, 2007; Emmitt, 2007). This approach involves clients, designers, main contractors, and subcontractors working together as a unified team, rather than as a disparate collection of separate organizations (Latham, 1994; Egan, 1998).

Accordingly, literature findings developed collaborative network for project management phase as illustrates in Figure 3. According to the Figure 3, network consists with client/owner, architecture/designer, contractor, project manager, subcontractor, QS, engineers, and project manager. All the stakeholders are centered to the client's project manager who typically fulfills the work on the project on behalf of the client. Project manager required to interrelate with all the stakeholders to attain project objectives. Hence, all stakeholders are eventually worked for the set of common goals. It is also clear that the project manager can be act as the broker who would strengthen the link of each stakeholder. Client's project manager plays a central role to coordinate the designed and construction phases.

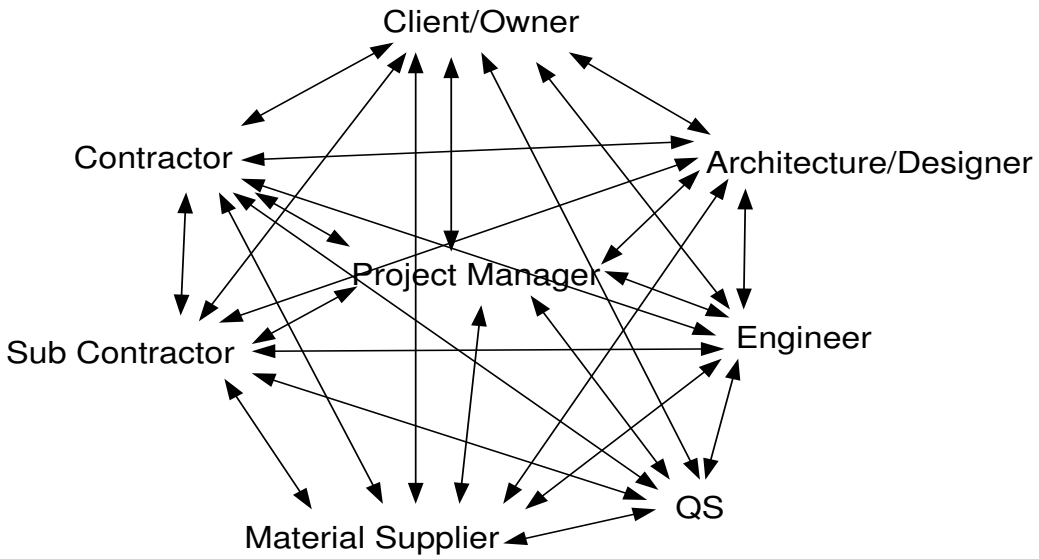

Figure 7: Collaborative network of PM

3.4 Collaborative Network in FM and Brokerage Potentials

Many FM authors describe, built environment as fragmented (Tuomela, et al, 2005) and involved with a number of stakeholders who are fulfilling various needs of its functional requirements. Coenen, Alexander and Kok, (2013) mentioned that FM is considered as a network of relationships which creates perceived value amongst these intra-organisational stakeholders. The relationships in FM are built with the co-creation of services, through integration of

resources and effective communication (Lehtonen, 2006). Thus, Lehtonen, (2006) noted that collaborative relations in facility services management seem by nature to be more operational than strategic under following options:

- Purchasing volume
- Only some relation-specific investments
- Low level of interdependence
- Service provider replaceable if necessary
- Benefits not shared equally, no risk sharing

However, it is recognised that the importance of the service delivery is significant for the client's or end-user's business, and therefore it is essential to share sensitive and strategic information, purchasing high volumes, or the manage the purchasing situation (Lehtonen and Ventovuori, 2006). However, the manner in which the individual stakeholders and their units affiliate and connect to the collaborative network can be analysed in many ways (Tuomela and Salonen, 2006). Gronroos (1996) suggested that partnerships and networks are formed with horizontal and vertical connections. Vertical connections of the network, refer to buyer-seller coordination and horizontal connections represent functional activities. Thus, Barrett (2000) showed that the collaborative networks should have strategic connections with strategic level of facility services management and operational connections with different functional units.

Moreover, Then (1999) revealed that FM as an integrated resource management framework that spells dramatic shifts in competencies for both the demand side (purchasers of facilities and services) and the supply side (suppliers and service contractors). Therefore, a demand perspective should focus on internal stakeholders in terms of building users, or broader, users of the facilities that are part of the responsibility of FM (Coenen, Alexander, and Kok, 2013). Authors, identified the most relevant key stakeholders in demand side perspectives, as clients, customers and end-users where strong relationships in FM are built through the co-creation of services, through integration of resources and through effective communication relationships (refer Figure 4). Jensen (2010) deliberated the supply-side perspective of value in the FM and explained the different ways that FM can add value to a core business. The stakeholders divided into owners, staff, customers, and society. Further author stated that the interests of different stakeholders such as the organisation itself (policy makers, staff, controllers, and facilities managers), owners (investors, shareholders), visitors, suppliers, customers, and society (local, regional, national, global) need to be considered in FM phase.

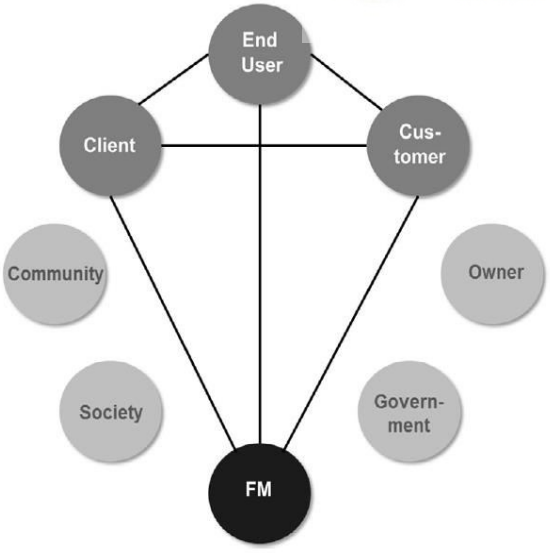

Figure 8: Stakeholders in FM
(Source: Coenen, Alexander, and Kok, 2013)

Tuomela (2003) introduced functional levels into the network, which divide the network into hierarchical levels of strategic clients, network integrators, and service units. Tuomela, et al, (2005) developed a model or a framework (refer Figure 5) for interaction of building in triadic networks that is derived from a knowledge base that explained the requirements of core businesses, key real estate and facilities services attributes and options evaluation to meet dynamic changes. The case study indicates that the networks of building users, owners, facilities management parties, and service providers can improve their interaction and cooperation with multilevel interaction building, mutual orientation building in groups and formation of boundary-spanning roles (Tuomela, et al, 2005).

Further, the authors indicated that stakeholders in the middle management are the network integrators focusing on operational management at the level of the decentralised business unit. These network integrators consist of in-house and external FM, PM and service providers, and part-time contract managers who function as an authority hierarchy between the centralised management and local service providers.

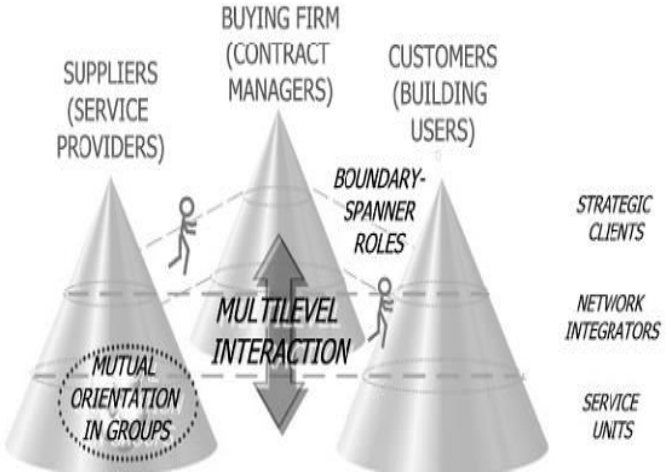

Figure 9: FM network
(Source: Tuomela, et al, 2005)

Moreover, Tuomela and Salonen (2005) formed a network with integrative organisational levels of strategic clients, network integrators, and functional service units, integrating stakeholders such as owner and service providers in the external networks. Authors, further mentioned that these networks can be used to understand the complicated roles within the built environment, considering the interaction needs of different functions. However, Heng and Loosemore, (2013) identified pools of disconnected information flows in these networks due to complexity functions in the built environment. For example, the authors mentioned that in hospitals, only a relatively small number of powerful departments play important brokering roles in connecting stakeholders.

It has been noted that the facilities management environment consists of network actor roles of service providers, building owners as contract managers, and the end-users of services. Figure 6 presents the findings of key literature survey where findings of the key players in FM supply china. According to the Figure 6, the client's facilities manager will be the key player of the network who will interact with all the stakeholders. The network is considered as client facilities manager coordinate the FM functions with the support of in-house and outsource staff (service provider).

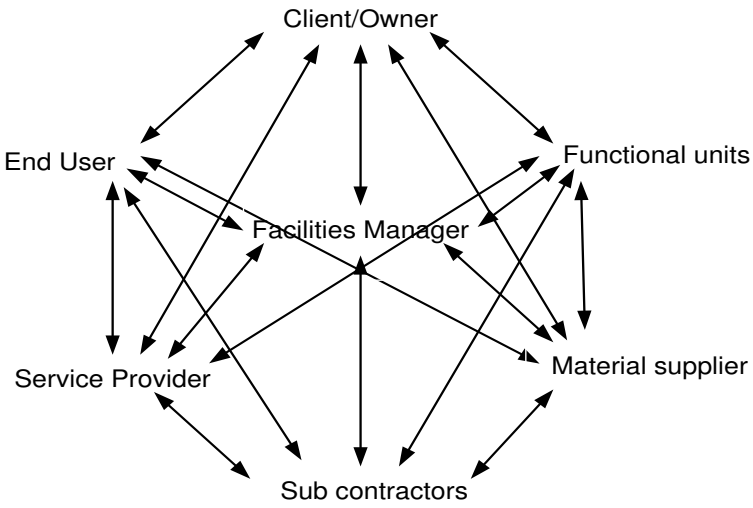

Figure 10: Collaborative network of FM

3.5 Collaborative Network in TFM and Brokerage Potentials

The development and use of built facility entails two major supply chains of project management and facilities management. Previous sections discussed the collaborative networks of those two phases separately. However, the generic problems with these networks are short term oriented and usually as strong as their weakest link. Nevertheless, Total Facilities Management required long term relationships which need to initiate from the PM phase and remains till

lifecycle of the built asset (De Silva et al. 2014). According to the Kumaraswamy et al (2012), sustainability and lifecycle imperatives, benefit from closer linkages, by integrating both supply chains given their intuitive interdependencies.

It is also found that same stakeholder in PM phase is performing various roles in FM phases. Brochner, (2007) studied the role of the contractors when they are providing FM services and identified that there is a unique project culture, typical of construction, which is difficult to reconcile with the emphasis on long-term relationships in FM contracts. Further, when, contractor need to enter FM phases with the strategy that includes continuous FM service delivery, associated with better learning of what makes their customers satisfied, should increase the potential for having more loyal, recurrent clients for construction projects.

In addition, David et al, (2010) and De Silva et al (2014) noted the importance in participating facilities manager in design and construction phase of a built asset project. The authors demonstrated that too often, facility managers are neglected in the design phase. It is clear whether this is out of deference to architects or because they are unaware of the design cycle or how design firms work. However, the proper relationship between the facility management team and design team need to be there in order to accomplish successful project.

Integrating FM phase with the PM phase of the facility would create long term relationships with the project team and those relationships could be prolonged to the facility operation and maintenance phases in terms of information, material, and service. Hence, network integrators would be contributed to a common value path where there will be less fragmented and less conflicts, especially latent defects (De Silva et al, 2014).

Therefore, a conceptual REVANS network for TFM of a built asset can be formed linking all stakeholders in the lifecycle of a facility (Figure 7). In a client led network, either project manager or facility manager can be act as the broker between two integrated networks for the betterment of the life cycle of the facility. Following Figure 7 shows the conceptual collaborative network for client led interactions.

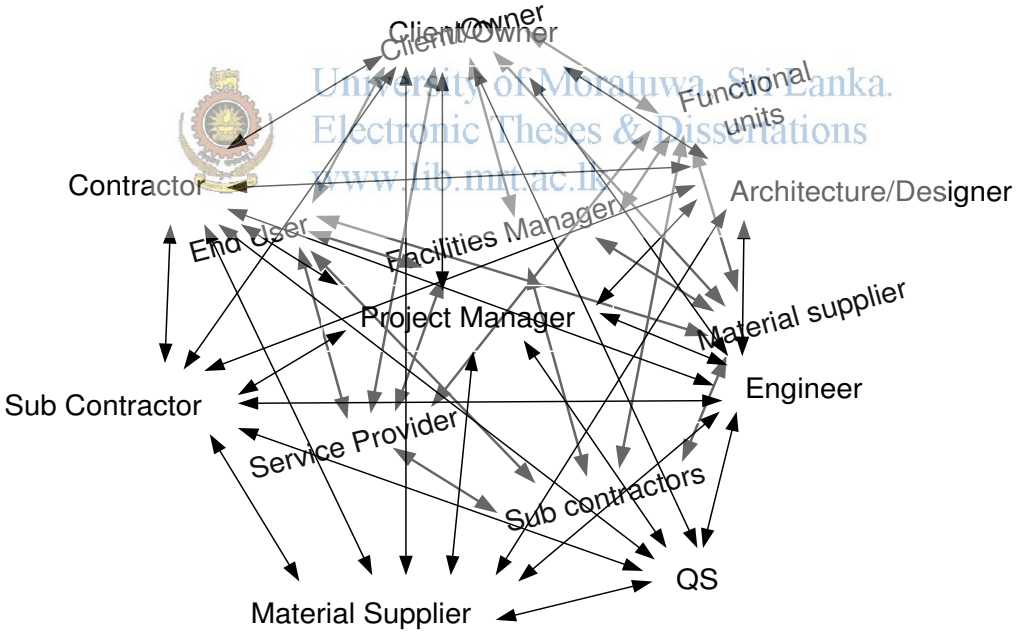

Figure 11: Collaborative network for TFM

Under such RIVANS networks, information, material, and service flow can be transferred from the PM to FM, phase in order to deliver better services to the end customer. However, paper developed a collaborative network by conducting the literature survey. Hence a gap of the interactions between stakeholders in the RIVANS needs to be discovered through a comprehensive empirical research which will be the next step in this research.

4.0 Conclusion and Recommendations

The extent of relational co-operation varies widely with the objectives of the stakeholders. A range of relationship types, such as strategic partnering and arm's length, strategic alliance, joint ventures exists in many industries. The research intention was to develop a conceptual network by integrating both supply chain networks in PM and FM

through common values. Integrating PM and FM eventually creates TFM collaborative network that represents the whole life cycle of built asset. In PM phase, stakeholders were centred to the client's project manager who acts as the broker in networks. The project manager would reinforce the interaction between various parties by eliminating weak collaborations to achieve common goals. Facilities Manager highlighted as the broker in FM phase where various stakeholders entail to accomplish the tasks of the operation and maintenance phases. The paper concluded that Facilities Manager and the Project Manager can be the key brokers of the TFM collaborative network who would link two phases with the common set of goals from the initial stage of the TFM. It was also highlighted that there are more structural holes exist in TFM network, which required to clarify through empirical analysis.

With the increased change of client perceptions and end user requirements it is essential to maintain strong ties between stakeholders who involved in both FM and PM phases. TFM network would be favourable for all stakeholders to enhance the performance of the lifecycle of the built asset.

5.0 Acknowledgement

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