Towards a Service Brokering Model for IT Departments

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Abstract: The accelerated increase of new IT suppliers and services is allowing organizations to easily access to specialized outsourced services. Consequently, IT departments are increasingly developing fewer IT services and relying more on external providers to satisfy the needs of their customers. This new context requires a change in the IT function, which should move from its traditional role of service builder and operator to a new role of service integrator and broker. However, IT managers do not know in most of the cases which are the capabilities, skills and resources required in the IT area to implement this new role. To cope with this lack, we propose a management model built in two steps: (i) a review of the literature that help us to identify and analyze the current contributions in the IT service brokering area, and (ii) to validate the findings made in the literature review through a focus group with IT professionals and managers. The presented model aims at establishing the basis for a complete approach to help IT organizations to adopt the IT service broker role.

1 INTRODUCTION

The development of the digital market and the accelerated increase of Information Technology (IT) suppliers in the last few years has produced a growing offer of increasingly specialized and robust IT services. In this context, business areas of the organizations are self-supplying IT services because they can find easy access and rapid response to their needs in the external market (Zimmermann and Rentrop, 2014). In many cases, they contract and access to external services without making requests, seeking approvals or consulting the IT department (Zimmermann and Rentrop, 2014). Gartner have found that around 30% of IT spending in large enterprises correspond to IT services and applications that have not been authorized by the IT department. In addition nearly 24% of corporate employee admit they have purchased and/or deployed a cloud application without the knowledge of their IT departments (Stratecast, 2016). If this is the case this could mean that the business areas would be meeting a part of their needs and taking advantage of the benefits offered by external services without the intervention of the IT department. However, this scenario could bring security threats since users would be overlooking the information security policies and requirements of their organizations (Zimmermann and Rentrop, 2014). Considering the potential benefits and risks associated to such scenario it could be said that the IT area should, on the one hand, facilitate the use of external IT services in order to allow business areas to reap the benefits they offer, and, on the other hand, govern the procurement and access to such services in order to reduce potential risks.

To succeed in, IT departments need to assume a new management model allowing them to intermediate between the external suppliers and the business customer in order to ease and control the supply of IT services. This model has been defined by Erbes et al. (2012) and Rackspace (2014a) as IT service brokering. According to these works, in this model IT exercises the role of intermediary between external suppliers and internal customers in the provision of IT services, with the aim of focusing its own efforts on the delivery of solutions that leverage the business strategy. In this new role, the IT department acts as a strategic partner and as the sole responsible for the provision of IT services to the business. But the reality is that in most of cases IT departments do not know how to take on this new model because there is a lack of knowledge about the organizational capabilities, roles, skills and resources that need to be changed or implemented in the IT function in order to offer a unique and flexible catalog of services that meets business needs from the aggregation and integration of external services.

Considering the need above mentioned, this research work contributes a conceptual model that aims at establishing the basis for a complete approach to help IT organizations to make the transition to this management model. This conceptual model was built by undertaken two steps: (i) a review of the existing literature in the IT service brokering area in order to identify and describe the capabilities, roles, skills and resources that the IT function needs when working as a service broker; (ii) a validation of the findings made in the literature review through a focus group activity in which IT professionals and managers working in the IT areas of different industrial sectors companies express their opinions and reactions.

This paper presents our work as follows: Section 2 presents the literature review by following a systematic method that help us to identify the main organizational elements of the IT Service Brokering model. Section 3 presents the findings of the focus group activity and introduces the resulting management model. Finally, Section 4 concludes the paper.

2 LITERATURE REVIEW

The following steps were used to conduct the review process: (i) Planning: This stage focuses on planning the search to identify the most relevant contributions. We define thus in this step the review objective and questions in order to conduct the search as well as select and validate the most pertinent works. (ii) Realization: It consists in making an exhaustive search for works defining the search criteria and assessing the found approaches in order to select those that answer the research questions. (iii) Analysis: This stage is related to the extraction of the relevant information of each selected approach and to synthesized it in order to answer the review questions.

2.1 Planning

The objective of this review is to identify and analyze the main organizational elements of the IT Service Brokering model stated in the literature. To perform this analysis, we propose the following review questions:

- What are the capabilities required by the IT area in the Service Brokering model?
- What are the roles required by IT experts in the Service Brokering model?
- What are the skills needed by IT experts in the Service Brokering model?
- What are the resources required by IT experts in the Service Brokering model?

2.2 Realization

With the purpose of finding potential research works answering the research questions previously announced, the Scopus database was used by introducing the following criteria:

- Search area: Computer Science, Business, Management and Accounting and Engineering.
- Document type: book, book chapter, article, conference paper and journal paper.
- Search field type: Abstract, title and keywords.
- Language: English.

The query introduced in the database was:
TITLE-ABS-KEY (("brokering" OR "broker" OR "mediator" OR "inter-agency" OR "interagency" OR "inter agency" OR "builder" OR "integrator" OR "integration" OR "composition" OR "composer" OR "decomposition" OR "decomposer" OR "break down" OR "breakdown" OR "unbundled" OR "unbundling" OR "brokerage") AND ("IT service" OR "ITC service" OR "cloud service" OR "saas" OR "paas" OR "iaas" OR "cloud computing" OR "cloud management" OR "outsourcing" OR "Information technolgy" OR "enterprise mashup") AND ("IT department" OR "CIO" OR "IT function" OR "IT area" OR "IT unit" OR "IT functional unit" OR "IT business unit" OR "IT functional area" OR "enterprise IT" OR "emerging trends" OR "academic research"))

With these criteria, the Scopus search engine returned 98 candidate articles. To evaluate the pertinence of these works, firstly, a review of the articles titles was carried out. This filter reduced the number to 35. Secondly, a reading of articles abstracts was undertaken to filter those works that do not present evidence of answering any of the analysis questions. This filter limited the number of articles to 12. Lastly, a complete reading of the articles was performed to select the final works set made up of 7 articles which were identified and included in the analysis.

Considering the low number of academic works that were found, we decided to carry out a Google search to find articles, books or white papers concerning our research objective. As a result, 5 white papers from technology companies that talk about the model were found. In addition, to include to our analysis the contributions made by practitioners in existing standards, best practices and reference frameworks in the area of IT service management, we include the following works to our review: IT4IT

(Information Technology for Information Technology) (TheOpenGroup, 2017), ITIL (Information Technology Infrastructure Library) (AXELOS, 2017), FitSM (Fitsm, 2017) and COBIT (Control Objectives for Information Systems and related Technology) (ISACA, 2012).

2.3 Analysis

A synthesis of the literature review with reference to the review questions is presented in Table 1. The detail of the found values is described below.

Table 1: Summary of the literature review results.

Question	Found values
What are the capabilities required by the IT area in the Service Brokering model?	· Supplier management · Service catalog management · Requirement management · Request fulfillment · Service level management · Offer management · Demand management · Knowledge management · Customer relationship management · Service portfolio management
What are the roles required by IT experts in the Service Brokering model?	· Supplier and partner manager · Service manager · Service portfolio manager · IT integration specialist · Enterprise architect · Financial manager/controller · Strategic Advisor · Business relationship manager · Business analyst · Service level manager · Catalog manager · Knowledge manager
What are the skills needed by IT experts in the Service Brokering model?	· Soft skills and customer orientation · Software integration skills · Relationship with suppliers and negotiation · Financial skills · Strategic thinking · Service improvement
What are the resources required by IT experts in the Service Brokering model?	· IT strategic plans · Business cases · Service performance reports · Business requirements · Contracts and SLAs · Business objectives achievement report · Service portfolio and catalog

What are the capabilities required by the IT function in the Service Brokering model?

To respond to this question, we understand a Capability as the particular ability that a company possesses to achieve a specific purpose or result (Blair and Marshall, 2016). The following capabilities for the IT department were extracted from the revision.

(i) Supplier management. This capability involves searching, contracting, integrating, supervising and managing a wide variety of external suppliers (Erbes et al., 2012) (Rackspace, 2014a) (Rackspace, 2014b) (AXELOS, 2017) (Fitsm, 2017) (ISACA, 2012). Besides this capability includes to obtain good value for money from suppliers and ensuring that all contracts and agreements with them meet business needs (AXELOS, 2017).

(ii) Service catalog management. This capability includes providing and maintaining the service catalog and ensuring its availability to those who are authorized to access it (Erbes et al., 2012) (Rackspace, 2014a) (Rackspace, 2014b) (AXELOS, 2017) (TheOpenGroup, 2017).

(iii) Requirement management. It consists in identifying customer needs, analyzing and prioritizing them according to the business strategy and, in conjunction with the catalog management capability, finding a service that meets such needs (Erbes et al., 2012) (Rackspace, 2014a) (ISACA, 2012) (TheOpenGroup, 2017).

(iv) Service level management (SLM). It is related to the negotiation, specification, design, publication, compliance and monitoring of Service Level Agreements (SLAs) (Gefen et al., 2011) (Wadhwa et al., 2013) (Rackspace, 2014a) (Rackspace, 2014b) (AXELOS, 2017) (Fitsm, 2017) (ISACA, 2012).

(v) Offer management. It is in charge of publishing the service portal entries and defining with precision and detail the services, including dependencies and prices (TheOpenGroup, 2017). It is also responsible for grouping specific offers for a specific group of customers (TheOpenGroup, 2017).

(vi) Demand management. It is specifically responsible for analyzing requirements, creating service requests, directing them to suppliers in collaboration with supplying management, as well as recording service consumption patterns (TheOpenGroup, 2017).

(vii) Knowledge management. This capability includes to collect, analyze, store and share knowledge and information in order to help customer to meet their needs. The objective is to reduce the number of requests for information and increase self-service.

(viii) Customer relationship management. It focuses on the relationship with customers, which includes to identify potential customers and their strategic needs, assign a responsible to manage the relationship to each one of them, establish communication mechanisms and manage complaints from them (Fitsm, 2017).

(ix) Service portfolio management. It is responsible for ensuring that the service provider has the right mix of services to meet required business outcomes at an appropriate level of investment. (Erbes et al., 2012) (Rackspace, 2014a) (Rackspace, 2014b) (TheOpenGroup, 2017) (AXELOS, 2017) (TheOpenGroup, 2017).

What are the roles required by IT experts in the Service Brokering model?

The following IT expert roles were identified as important in this model:

(i) Supplier and partner manager: This role addresses simultaneously the management of multiple suppliers. It works in conjunction with the legal office to conclude contracts and agreements with suppliers. (Erbes et al., 2012) (Gefen et al., 2011) (Willcocks et al., 2012) (Rackspace, 2014a) (Rackspace, 2014b) (HewlettPackard, 2013) (Stratecast, 2016).

(ii) Service manager: It is in charge of managing the lifecycle of services including the contracting, implementation, evaluation and continuous management of new and existing services (Erbes et al., 2012) (Rackspace, 2014a) (Rackspace, 2014b) (Stratecast, 2016) (ISACA, 2012).

(iii) Service Portfolio Manager: It is responsible for ensuring that the service provider has an adequate offer of services by analyzing financial, demand and risk aspects. This role produces analysis documents to help executive managers to make decisions about adequate sourcing models (insourcing, outsourcing, cloud, etc.) and service options to fulfill customer's needs.

(iv) IT service integration specialist: this role is in charge of developing integration modules for services from different suppliers in order to offer a unique service to the customer (Rackspace, 2014a) (Rackspace, 2014b) (Ragowsky et al., 2014) (Hoyer and Stanoevska-Slabeva, 2009).

(v) Enterprise architect: This role has a holistic view of the company's needs at strategic, tactical and operational levels. It is in charge of align IT infrastructure and services with the evolution of such needs (Rackspace, 2014b) (HewlettPackard, 2013).

(vi) IT Financial manager/controller: Since IT is one of the biggest expenditure aspects in companies,

it becomes indispensable to have roles in charge of IT cost accounting, financial forecasting, and decision making process. Such roles need to work in collaboration with the portfolio manager (Gefen et al., 2011) (Ragowsky et al., 2014) (Rohmeyer and Ben-Zvi, 2012) (HewlettPackard, 2013).

(vii) Strategic Advisor: The strategic objectives of the company can be leveraged through the adequate IT strategy and services. Therefore, expert consultants or auditors are required to advise the business from technology possibilities (Gefen et al., 2011) (Ragowsky et al., 2014) (Rohmeyer and Ben-Zvi, 2012) (HewlettPackard, 2013).

(viii) Business relationship manager (BRM): The professional in charge of maintaining a positive relationship with customers (AXELOS, 2017). The BRM identifies the strategic needs of existing and potential customers and ensures that appropriate services are acquired to meet those needs.

(ix) Business analyst: A role that is in contact with customers and users and is responsible for the requirements management from tactical and operational viewpoints (Erbes et al., 2012) (Rackspace, 2014a) (TheOpenGroup, 2017).

(x) Service level manager: the role responsible for negotiating and defining service level agreements (SLA) and ensuring that they are met (AXELOS, 2017) (Fitsm, 2017).

(xi) Catalog manager: it defines and maintains the service catalog, and ensures that all the information contained in the catalog is accurate and up-to-date (AXELOS, 2017) (Fitsm, 2017).

(xii) Knowledge manager: It ensures that the IT organization is able to collect, analyze, store and share knowledge and information (AXELOS, 2017).

What are the skills needed by IT experts in the Service Brokering model?

Skills are grouped by subject and described as follows:

(i) Relationship with suppliers and negotiation: It include skills to deal with searching, evaluating, integrating and orchestrating multiple suppliers, and having the ability to maintain good relations with them and other external partners (Erbes et al., 2012) (Gefen et al., 2011) (Willcocks et al., 2012) (Rackspace, 2014a) (Stratecast, 2016) (AXELOS, 2017). It requires knowledge in market analysis and how to negotiate and obtain mutually beneficial contracts. In order to work in collaboration with the legal office to contract suppliers, IT experts also need skills in the legal and contractual aspects of IT outsourcing (Gefen et al., 2011) (Ragowsky et al., 2014).

(ii) Financial skills: Skills in cost accounting, financial controlling, budget management, financial indicators and financial forecasting are necessary in this new model (Gefen et al., 2011) (Willcocks et al., 2012) (Ragowsky et al., 2014) (HewlettPackard, 2013) (Stratecast, 2016). Even though these kind of skills already exist in financial and accounting departments, professionals of such areas do not know the specific characteristics of IT service and project management so that these skills are also necessary in IT staff.

(iii) Strategic thinking: IT experts need strategic and critical thinking, analytical skills, capability for decision making, problem solving skills, creativity and strategic analysis (Erbes et al., 2012) (Ragowsky et al., 2014) (Rohmeyer and Ben-Zvi, 2012) (Willcocks et al., 2012) (Rackspace, 2014b).

(iv) Soft skills and customer orientation: These skills include communication at the commercial level, team work, negotiating capacity, conflict resolution, integrity, interpersonal skills and flexibility. Those are essential because of the continuous and intensive relationship with customers, users and other stakeholder (Erbes et al., 2012).

(v) Software development skills: When services are contracted from different providers, and integration is required to solve a business need, IT experts should have software development skills on multiple platforms to undertake such integration (Ragowsky et al., 2014) (Rackspace, 2014a) (Hoyer and Stanoevska-Slabeva, 2009).

(vi) Service improvement: IT experts should have the ability to generate clear SLAs, service performance metrics and continuous monitoring to take preventive and corrective measures and develop improvement plans (Hoyer and Stanoevska-Slabeva, 2009) (Rackspace, 2014b) (Stratecast, 2016) (AXELOS, 2017).

What are the resources required by IT experts in the Service Brokering model?

(i) IT strategic plans: It makes reference to strategic goals, objectives, strategies and plans formulated to lead IT in alignment to business plans and objectives (Ragowsky et al., 2014) (Rohmeyer and Ben-Zvi, 2012).

(ii) Business cases: Justification for a significant item of expenditure. It includes information about service options, benefits, costs, risks and issues (AXELOS, 2017).

(iii) Service performance report: report of achievement and trends against Service Levels Targets (SLT) agreed in SLAs. The format, content and frequency of reports should be agreed with customers.

(iv) Business requirements specification: Document containing needs and restrictions expressed by business customers about an IT service (Erbes et al., 2012).

(v) Contracts and SLAs: A contract is a legally binding agreement between two or more parties. A SLA describes the IT service, documents SLT, and specifies the responsibilities of the IT service provider and the customer (AXELOS, 2017) (Gefen et al., 2011).

(vi) Business objectives achievement report: report of achievement made with the help of IT against pre-established business objectives (ISACA, 2012).

(vii) Service portfolio and catalog: The service portfolio contains the complete set of services managed by a service provider. It includes three categories: service proposed or in development, service catalog (in operation or available for deployment), and retired services (AXELOS, 2017).

3 SERVICE BROKERING MODEL

From the literature review, we identified and synthesized a set of common organizational elements (see Table 1), that can help IT departments to broker IT services. However, a conceptual model that links such elements and states their relationship was not found. For this reason, we decided to carry out a focus group in order to identify the relationship between the elements found in the literature review and validate the extent to which such findings are being implemented in the industry. A conceptual model is then proposed from this activity.

3.1 Focus Group Activity

A focus group is a popular qualitative research technique, which consists in small groups of people guided by a moderator through an unstructured and spontaneous discussion with the aim of obtaining relevant information about a research problem (Greenbaum, 1988). For this research work, the focus group included 8 IT professionals working in different positions in large international companies operating in a South-American country. We conducted the activity through a spontaneous discussion by asking the percentage of outsourced services the participants had in their departments and

which were the main capabilities, roles, skills and resources in their IT areas. The main results are described as follows:

- *Capabilities:* the main capabilities referred by the participants were requirement, service level and supplier management. As request fulfillment was not indicated by any participant, this capability is not included in the model. Because of the unstructured and spontaneous nature of the activity, there was room for participants to talk about other IT capabilities that are not necessarily involved in role of IT as a service broker such as software development and incident management. They argued that those more "technical" capabilities are becoming less common in their departments.

- *Roles:* Regarding the roles form the review, supplier manager and business and requirement analysts were the most common. Even though development and operation roles such as software developer, as well as server, DB and network administrators, were also referred. However, the participants argued that those roles are less and less necessary in their organizations.

- *Skills:* Participants argued that skills such as supplier management and systems integration skills are increasingly required. Spontaneously they said that technical skills in software, hardware, operating systems and DB are still required in their departments.

- *Resources:* The participants agreed on the importance today of the resources identified in the literature review. However they emphasized that their IT departments still have infrastructure resources such as development tools, applications, servers, networks, etc.

- *Relationships:* The relationships identified between the elements are described in the next subsection.

This activity allowed us to gather new information that indicates that even though IT areas have advanced to the implementation of the service broker role, in most of the cases they continue to implement the traditional role of IT service developer and operator. From these findings, we propose a develop a Service Brokering model in the next subsection.

3.2 Towards a Service Brokering Model

In Figure 1 we propose a conceptual model that includes the organizational elements and their relationship found during the literature review and the focus group activity. This model shows six types of elements: (i) External role: stakeholders that participate outside the IT department, i.e., customers, suppliers and executive board. (ii) Internal role: it relates groups of people with related responsibilities that participate within the IT department, e.g., supplier and partner manager or business analyst. (iii) Capability: it concerns a set of activities to obtain a specific objective. Capabilities are described in bold font in the figure, e.g., demand management and catalog management. (iv) Management resource: an essential element or asset used by the IT function to broker services, e.g., contracts and SLAs. (vi) Relationship: it is used to represent the connections or interactions between capabilities.

Several integration sequences between capabilities can be identified by navigating the relationships between them. We describe one of these sequences in which business requirements are fulfilled through contracting a new service with an external supplier (see Figure 1): The customer raises requirements that are gathered by the requirement management (functional requirements), business relationship management (strategic requirements) or service level management (service level requirements) capabilities. Then, such requirements are correlated in order to identify similar existing demand or create new demand. Such demand is prioritized and converted in requests for new or modified services by the demand management capability according to the strategic business plan. These requests are then addressed by the portfolio management capability through the identification of several service options and sourcing models that could fulfill them. For each service request, a business case including financial, risk and functional aspects is thus built in order to evaluate the different options and be presented to the company's Executive Board that decides for the best option. Then, supplier management will contact the external supplier offering the selected service option. Once the SLA and contract has been agreed and signed by both parts, the service catalog and portfolio are updated by the catalog and portfolio management capabilities respectively. In addition, an entry with the new service will be added into the service portal by the offer capability in order to make it accessible by the customer. In the portal customers can consult detailed information about the services that are ready to consume. When a customer is interested in a service, she makes a request that is managed by the offer management. Transversely to all the aforementioned interaction, the knowledge management capability
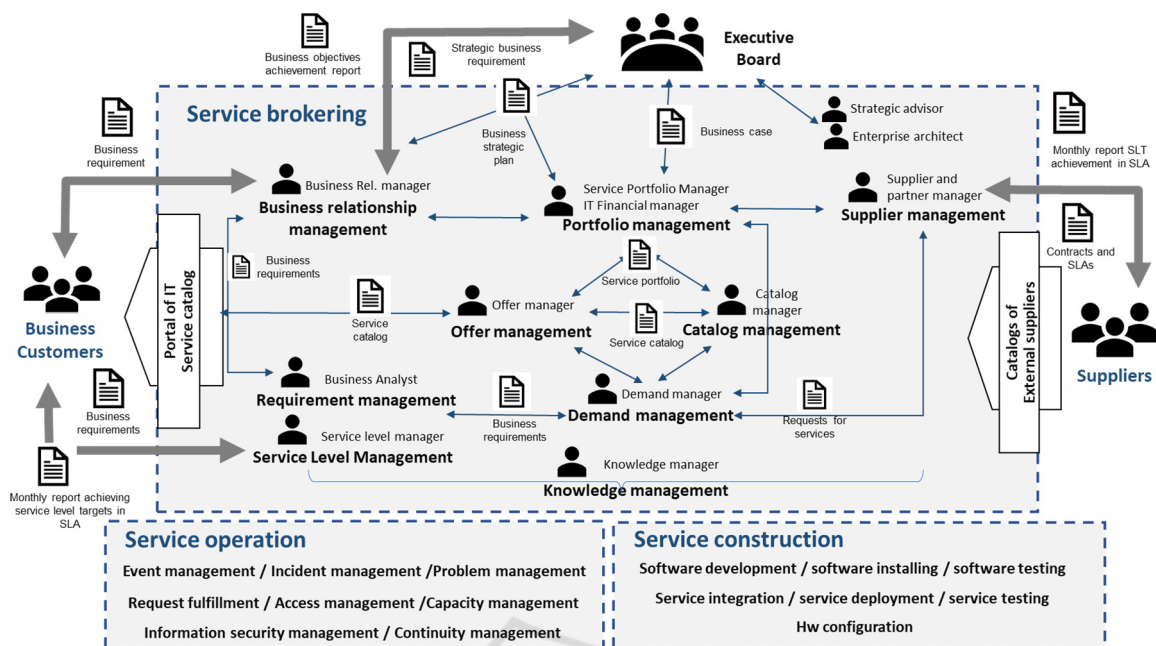
Figure 1: Conceptual model for IT service brokering.

gathers and registers knowledge generated by suppliers and the IT department in order to make it available to other capabilities and customers.

4 CONCLUSIONS

This article proposes a conceptual model which synthesizes the main organizational elements that need to be implemented by the IT area when working as a service broker. The main conclusions of the work made are described as follows.

Concerning capabilities, IT departments are moving from focusing on technical capabilities to organizational ones. For instance, today IT departments require a supplier management capability, similar to the one of the procurement department, allowing the organization to access to external IT services. Regarding roles of IT experts, we identified an increase in new roles in the following areas: (i) Management, IT experts that coordinate and manages IT suppliers, contracts, services and customers; (ii) consultancy, experts who advise to make sound decisions for the organization; and (iii) technology: technology experts that integrate and customize IT services and leverage the business strategy through technology. In addition, we found that although technical traditional roles in service development and operation are still present in organizations, they are less common and are being

shifted towards supplier companies. Regarding resources, they follow the same way that capabilities in the sense that IT departments are moving from focusing on technical resources (such as applications, servers or routers) to management resources (such as contracts and SLAs) allowing them to manage intermediation between suppliers and customers.

Concerning future work, further research is needed in order to improve the conceptual model presented in this work. First, it is necessary to carry out a complete analysis of all the potential sequences between capabilities by analyzing the whole set of relationships between them. Second, research efforts are necessary in order to understand how is the interaction between the capabilities of the IT Service Brokering model and the capabilities of the traditional IT service development and operation models. Third, to validate the model, it is necessary to use additional methodology tools such as case studies or surveys. This could add more information from more companies and different sources.

Concerning the IT service brokering as a subject of study, one of the main findings is the lack of academic and industrial research works and best practices in this domain, which has had repercussion in the ability of companies to migrate to this model. (Rackspace, 2014b) shows that most IT executives see the IT Service Brokering model as a priority but only 25 percent have made a progress in its adoption. Furthermore, according to (Wadhwa, 2014), there is a clear gap in academic research in the area. From the

literature review presented in this work, we can observe that the reviewed works are too focused on presenting the urgency of a change in the IT function. However, these works fail in proposing a set of good practices or formal frameworks to carry out such change. Only IT4IT (The Open Group, 2017) has specifically proposed the Request to Fulfill (R2F) workflow that helps IT organizations to move towards a service intermediary model. As a consequence, we consider that there is a need for academics and practitioners to get involved in studies regarding organizational change and transformation (Avila and Garces, 2016) as well as tools, models, best practices and case studies to improve the contributions in the IT service brokering area. Last but not least, the link of this research domain with the decision making domain is necessary in order to provide a holistic approach to practitioners allowing them to cover from service and provider selection to service performance follow-up (Ruiz and Avila, 2017).

REFERENCES

Avila, O. and Garces, K. (2016) Change Management Support to Preserve Business–Information Technology Alignment. *Journal of Computer Information Systems*, 57(3): 218-228.

AXELOS (2017). ITIL publication reviews. *[online] Available from: https://www.axelos.com/best-practice-solutions/ itil/itil-publications [12 Nov. 2017]*.

Blair, A. and Marshall, S. (2016). Open group guide business capabilities. *The Open Group*.

Devoteam (2014). IT service excellence. *Devoteam*, pages1–16.

Erbes, J., Nezhad, H., and Graupner, S. (2012). From IT providers to IT service brokers: The future of enterprise it in the cloud world. *Computers*, 45:66-72.

Fitsm (2017). The fitsm standard. *[online] Available from: http://fitsm.itemo.org [12 Nov. 2017]*.

Gefen, D., Ragowsky, A., Licker, P., and Stern, M. (2011). The changing role of the CIO in the world of outsourcing: Lessons learned from a CIO roundtable. *Communications of the Association for Information Systems*, 28:233–242.

Greenbaum, T. (1988). The practical handbook and guide in focus group research. Lexington, MA: D. C. Heath.

HewlettPackard (2013). Be an it services broker. *HP*, pages 1–7.

Hoyer, V. and Stanoevska-Slabeva, K. (2009). The changing role of IT departments in enterprise mashup environments. *ICSOC Workshops. Lecture Notes in Computer Science*, 5472.

ISACA (2012). COBIT 5. ISBN 978-1-60420-282-3.

Rackspace (2014a). 7 tips on becoming an IT service broker. *Rackspace*, pages 1–11.

Rackspace (2014b). Managing the transition to IT as a service broker. *Rackspace*, pages 1–10.

Ragowsky, A., Licker, P., Miller, J., Gefen, D., and Stern, M. (2011). Do not call me chief information officer, but chief integration officer. A summary of the 2011 Detroit CIO roundtable. *Communications of the Association for Information Systems*, 34:1333–1346.

Rohmeyer, P. and Ben-Zvi, T. (2012). Emerging trends in decision making of IT leaders. *Proceedings of the PICMET '12: Technology Management for Emerging Technologies,* pages 667–671.

Ruiz, J.J. and Avila O. (2017) Identifying criteria for evaluating Cloud Services in the Colombian public sector. *Americas Conference on Information systems, Boston*, MA, USA

Stratecast (2016). Thinking of adopting an IT service brokermodel? these four reasons will convince you the time is right. *Stratecast*.

The Open Group (2017). The open group it4it reference architecture. *The Open Group*.

Wadhwa, B., Jaitly, A., and Suri, B. (2013). Cloud service brokers: An emerging trend in cloud adoption and migration. *Asia-Pacific Software Engineering Conference, APSEC*, 2:140–145.

Wadhwa, B., Jaitly, A., and Suri, B. (2014). Making sense of academia-industry gap in the evolving cloud service brokerage. *1st International Workshop on Software Engineering Research and Industrial Practices*, pages 6–9.

Willcocks, L., Venters, W., and Whitley, E. (2012). Cloud sourcing: Implications for managing the IT function. *The Dynamics of Global Sourcing. Perspectives and Practices. Global Sourcing 2012. Lecture Notes in Business Information Processing*, 130:142–163.

Zimmermann, S. and Rentrop, C. (2014). On the emergence of shadow IT - a transaction cost-based approach. *22nd European Conference on Information Systems, CIS*.