EasyChair Preprint

№ 5410

# Models and Frameworks for IS Outsourcing Structure and Dimensions a Holistic Study

Eman Elnakeep, Iman M. A. Helal and Sherif A. Mazen



April 28, 2021

# Models and Frameworks for IS Outsourcing Structure and Dimensions

## A Holistic Study

Eman Elnakeep[1[0000-0002-8022-9045]], Iman M. A. Helal[1[0000-0001-8434-7551]] and Sherif A. Mazen[1[0000-0001-5079-218X]]

[1] Faculty of Computers and Artificial Intelligence, Cairo University, Giza, Egypt
emanelnakeep123@gmail.com, {i.helal, s.mazen}@fci-cu.edu.eg

**Abstract.** Organizations can outsource information systems (IS) at various scales, from a little percentage of services to the whole range of services that they want. in which an organization decides to separate the IS-related tasks and outsource them to another organization to produce, based on a defined contract. Different factors affect the organization's decision to outsource. After the decision to outsource is taken, an organization must decide on the type of outsourcing model to follow. There are various outsourcing models and frameworks and each of them focus on specific dimensions like strategic, capability, resources, financial, relationship, organizational structure, institutional arrangements, knowledge, management, security, computability, function characteristics and performance.

Also, there are some challenges/ limitations in the existing outsourcing models and frameworks like a restriction to specific outsourcing environments, determining performance outcomes, risks and organization issues, knowledge integration and lack of factors that needed to be added in each outsourcing model to improve the performance of the model. There is no outsourcing model/ framework that decides which of these dimensions should be included.

The aim of this paper is to present a comparative study of the existing outsourcing models and frameworks. The results of this study lead to insights into their capabilities, dimensions, factors, advantages, and limitations for building an enhanced and integrated outsourcing model.

**Keywords:** Outsourcing, Models, Frameworks.

## 1 Introduction

Information systems (IS) have evolved over the years and become an important component of any organization. Thus, the organization must decide among few options to get new software. The first option is to develop in-house software which incurs a lot of money and effort. The second option is to buy ready-made software to solve a specific problem. Despite having many advantages, it still has a major setback as the organization will always be not aware of the inner components of the software that they are

dealing with. Finally, the third option is to outsource the software development to an external party.

Outsourcing is one of the possible solutions in which an organization decides to separate IS-related tasks and provide them to a different organization to supply. Outsourcing can play an important role in improving the performance and quality of IS development. It has several key advantages, such as cost reduction, usage of skilled personnel, focus on the core business area, management overhead of employing and maintaining an IS task force, keeping up-to-date technology [1]. There are several areas that utilize from outsourcing IS-related tasks. For example: application development and maintenance, managing network, testing, integration, and data entry [2].

After the decision to outsource is taken, an organization must decide on the suitable type of outsourcing model to follow. The previous studies show the importance of using outsourcing in achieving information system tasks. Also, it shows the dimensions and their related factors that affect outsourcing models and frameworks that contribute to achieving successful outsourcing.

In this paper, we aim to determine the main dimensions and their related factors affecting the outsourcing models and frameworks. Also, we aim to present a comparative study of the existing models and frameworks with their advantages and limitations.

The rest of this paper is organized as follows: an overview of IS outsourcing with its basic concepts and characteristics in section 2. Section 3 discusses related work of outsourcing models and frameworks. Section 4 discusses the results that we derive. Finally, we conclude the paper in section 5 with an overlook of the future work.

## 2 Background Study

In this section, we will cover basic concepts related to information systems outsourcing in section 2.1. In section 2.2 will present the most common benefits and drawbacks of IS outsourcing in the literature.

### 2.1 Definitions, types and levels of IS Outsourcing

Outsourcing is a common practice in many large organizations around the world. This practice can lead to the improvement of the organization's efficiency [1]. There are various outsourcing **definitions**. It can be defined as a decision-making process, where the management of the organization decides whether they would keep a specific activity in-house or buy it from an external subcontractor [3]. In [4], outsourcing is a production of services externally which are consumed by any enterprise. And in this paper, we define *outsourcing* as a strategy in which an organization contracts other organization to provide services externally, which may involve transferring employees and assets from one organization to another.

Outsourcing can also be categorized into three different **types** which are *total*, *selective*, and *transitional* outsourcing. The organization uses total outsourcing when moving more than 80 percent of the organization's business operating budget to an external service provider. When an organization outsources a preferred function to single or multiple vendors while managing between 20 to 80 percent of the business in-house,

this is called selective outsourcing while transitional outsourcing occurs during a major transition for an organization to the new platform or system, such as bringing in new technology [5].

According to [5], there are three different **levels** of outsourcing available to firms which are *tactical*, *strategical* and *transformational*. An organization should choose tactical outsourcing when they are faced with a specific problem and want to quickly solve it. Strategic outsourcing is a more advanced approach taken to maintain an organization's primary value and its core competencies, whereas transformational outsourcing is the most developed form of cooperation with the service provider in outsourcing.

### 2.2 Advantages and Drawbacks of Outsourcing

There are several benefits and drawbacks for applying outsourcing in an organization. Each organization selects the suitable type and level of outsourcing according to them.

**Benefits of Outsourcing**

The most important benefits of IS outsourcing [6, 7] are stated as follows:

1. *Expertise and fast delivery*: It ensures better performance and quality with highly skilled domain experts, suitable equipment and technologies.
2. *Focus on core business*: It helps organizations to utilize their time on their core activities and gain a competitive advantage over other organizations.
3. Reduced costs: It reduces the need to hire individuals in-house. Thus, it minimizes set up, operational, and recruitment costs, as well as better, utilizes time.
4. *Risk-sharing*: It involves components that help the organization to transfer certain functions to the outsourced provider, who plans a risk-mitigating factor better.
5. *Improvements in service and quality level*: The outsourcing vendor can provide more proficient services via suitable technical skills and make quicker deliveries to customers that accommodate rapid changes in technology.
6. *Flexibility and control*: It aids in adapting to a rapidly changing market, supporting organizations with better flexibility and control to the changing environment.

**Drawbacks of Outsourcing**

The main risks of IS outsourcing [6, 8] are stated as follows:

1. *Danger of exposing sensitive data and technology*: An organization involves a risk of exposing confidential organization information in addition to technology to a third-party during the outsourcing process.
2. *Many Hidden costs*: Outsourcing includes hidden costs involved in switching vendors, signing a contract while signing a contract across international boundaries may pose a serious threat.
3. *Possibility of Weak Management*: It can be more difficult for organizations to deal with a new type of management, i.e., outsourcing management.

4. *Lack of customer focus*: An outsourced vendor may need to serve many organizations at a time. Therefore, they will lack an entire specialize in the client organization's tasks.
5. *Inexperienced Staff*: Clients are usually supported by their own staff transferred to the seller during the outsourcing process. This transfer can lose the experienced IT staff of the organization to the vendor organization.
6. *Business Uncertainty*: Organization's needs can change after the outsourcing decision. So strategic intent must be restated according to this change.
7. *Outdated Technology and Skills*: If the vendor cannot keep up with the changes in the market and specific sectors, the organization may have outdated technology at the end of the contract term.
8. *Loss of Innovative Capacity*: The innovation capacity of the organization may be impaired after outsourcing due to its dependency on the vendor(s) in outsourced operations/services.

## 3 Assessment of Outsourcing Models and Frameworks

There are several dimensions (section 3.1) affecting outsourcing models and frameworks (section 3.2), where each model and framework focus on specific concerns/dimensions.

### 3.1 Dimensions in Outsourcing Models and Frameworks

There are several dimensions that affect outsourcing models, frameworks, and system architectures, these dimensions are as follows:

1. **Strategic** dimension includes mergers and acquisitions, and business transitions and reduction in project delivery lead time [9].
2. **Financial** dimension includes cost reduction through reducing total assets and the number of employees involves in the project. This can also improve the financial performance index and cash flow [9].
3. **Capability** dimension includes an assembly of skills, techniques, technologies which enable an organization to acquire, deploy, and leverage investments in pursuit of business strategies and increase productivity [10].
4. **Resources** dimension includes access to external expertise and technical skills needed. This will help the organizations to achieve competitive advantages after delegating outsourced services to a vendor organization [9].
5. **Relationship** dimension is the main reason for a successful partnership between organizations because the interaction between the parties is based on human resources, good communication and compatibility to achieve the quality of the partnership between two parties [1].
6. **Knowledge** dimension includes transferring and utilizing knowledge which helps organizations to create advantages for competing in the market and improve efficiency and performance of processes [11].

7. **Organizational structure** dimension describes how certain activities are coordinated to realize the objectives of an organization. It includes roles, responsibilities, rules and layers in the hierarchy [10].
8. **Institutional arrangements** dimension involves policies, systems, and processes that organizations use to organize and manage their activities efficiently and to effectively collaborate with others [12].
9. **Function characteristics** include a business function that is delivered to business customers by business units. The function has some characteristics that affected it that should be considered to ensure the successful delivery of business services [13].
10. **Management** dimension includes legal contracts that can achieve project goals and create positive competition, coordination to ensure that interdependence of tasks and responsibilities is well managed between two parties [9].
11. **Security** dimension includes information security that is a set of practices, protocols, strategies, policies, procedures, standards, techniques and tools that protecting information by mitigating information risks, Information security's primary objective is the balanced protection of confidentiality, integrity and availability of data [14].
12. **Performance** dimension includes methodologies, processes and metrics to manage and optimize business performance and overcome potential problems and risks. it provides key performance indicators (KPI) that help organizations monitor the efficiency of projects against operational targets [10].

Fig. 1 shows the relationship between dimensions that existed in the outsourcing structure. The outsourcing process should start with a strategic dimension. Strategic evaluation reflects the extent to which the outsourcing team carried out a comprehensive assessment of the strategic implications of outsourcing the business activity. The degree to which firms effectively perform a strategic evaluation is concurrently reflected by their evaluation from a capability and financial perspective [15]. So, the capability and financial dimensions are considered as output for the strategic evaluation process.

Capability is often combined with required resources, persons, organization's services, knowledge and technologies. So, we need to identify resources that will help to perform the business activity. So, the capability dimension is considered as a prerequisite for the resources dimension. There is a relationship between capability and organizational structure. It is used to describe the structure within an organization. It identifies each job, its function and where it reports to within the organization. A provider's organizational structure can be considered as an intermediary of the relationship between the client's actions and the provider’s outsourcing capabilities that were designed to support the client [10].

So, organizational structure is used to assign roles to activities that are set by capability, hence we see capability dimension as a prerequisite for organizational structure dimension. There is a relationship between institutional arrangements and organizational structures as institutional arrangements refer to formal governmental organizational structures as well as informal standards in place in a country for arranging and undertaking its own policy actions. These arrangements are essential, as they provide

the government, at all levels, with the framework for formulating and executing policies. So, the output of determining/ making organizational structure process can be input for the institutional arrangements dimension as part of its process.

The relationship is the main reason for successful cooperation/partnership between organizations and IT providers. clients should have a close relationship with the provider to achieve effective IT outsourcing because IT outsourcing relies on human resources [1]. Hence, we consider resources as prerequisites for the relationship dimension because building and sustaining a successful relationship depends on resources. Knowledge can be shared effectively through efficient use and utilization of capability and relationship dimensions [11].

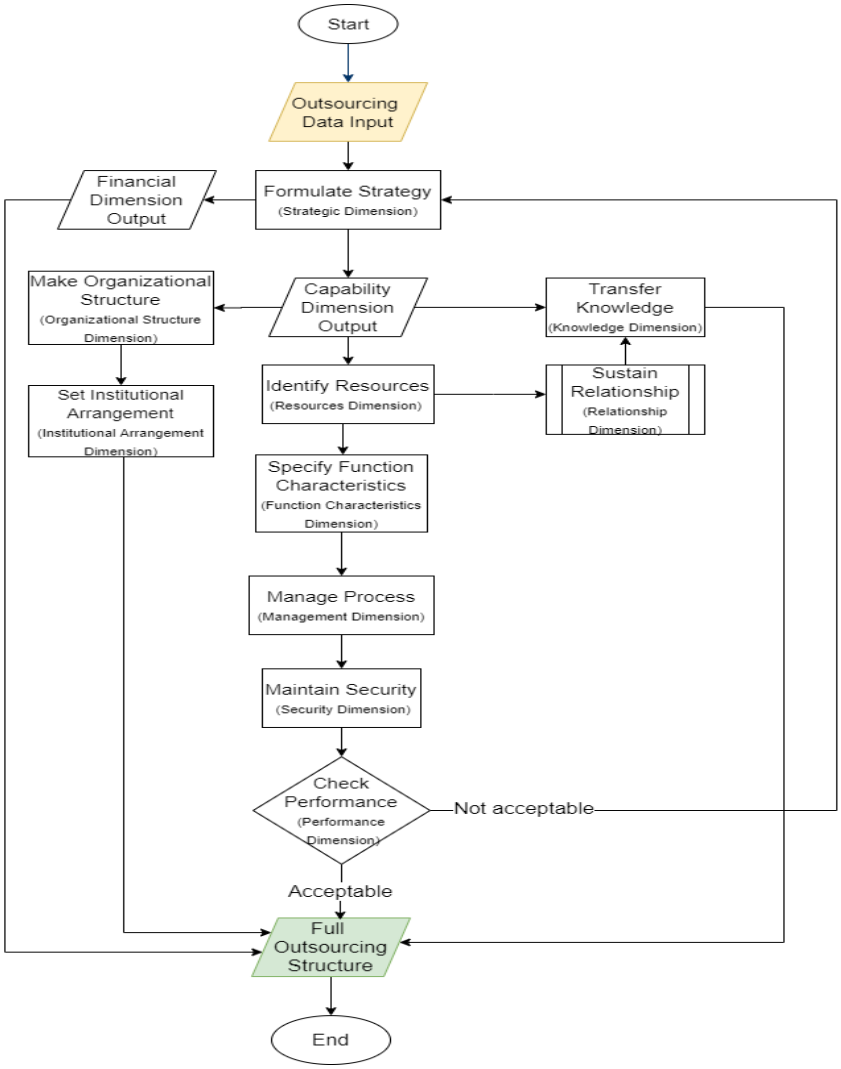


**Fig. 1.** Dimensions required to reach satisfying/ acceptable outsourcing structure

Therefore, these two dimensions can be used as input for achieving successful knowledge transfer and utilization process. A function is a service that is delivered to business customers by business units. Functions have some characteristics that affected them as the complexity of function, function integration and structure, function control and equipment/ tool availability [13]. So, we need first to allocate resources responsible for function implementation before set function characteristics. So, we see resources are considered as input for the set function characteristics process.

The management dimension is considered a wide umbrella that contains a lot of processes, activities and practices like resource allocation, set function characteristics, coordination and administration of tasks to achieve goals [13]. Hence, the set function characteristics process is the responsibility of management. The security dimension is an important dimension to protect information and mitigate risks. So, we need to ensure security to prevent any unexpected behavior that can arise and keep the outsourcing structure more secure. Finally, we can check the performance if it is acceptable, we can get an acceptable and satisfying outsourcing structure. If not, we should return to the first process which is the strategic evaluation to revise and check it again.

Table 1 illustrates a brief sample of the dimensions and their factors. It shows the most common factors per each dimension based on existing studies in the literature.

**Table 1.** Factors affecting each Dimension

| # | **Dimension** | **Factor(s)** |
|---|---|---|
| 1 | Strategic | Time, strategic partnership, organization strategy |
| 2 | Financial | Cost, savings, lending, investments |
| 3 | Capability | Technical, technology, skills, experience, user training and consulting, know-how |
| 4 | Resources | Technical staff, end-users, culture |
| 5 | Relationship | Culture compatibility, temporal, standard, loyalty, trust, commitment, interaction, quality, interface characteristics, information sharing, strategic compatibility, flexibility |
| 6 | Knowledge | Quality content, accuracy |
| 7 | Organizational structure | Competences, responsibilities, roles, degree of formalization, specialization, standardization, layers in the hierarchy, horizontal integration, and professionalism, business environment |
| 8 | Institutional arrangements | Policies, systems, processes, laws, regulations |
| 9 | Function/ service characteristics | Complexity of function, function integration and structure, function control and equipment/tools availability |
| 10 | Management | Contract, leadership, coordination, organizational factors (shared values, norms, beliefs, development process), risk management |
| 11 | Security | Confidentiality, integrity, availability, access control, firewall, authenticity |
| 12 | Performance | Balanced scorecard, key performance indicators (KPIs), reliability, quality performance, supporting infrastructure, performance contract |

### 3.2 Outsourcing Models, Frameworks and System Architectures

In this subsection, we will present a detailed description of each outsourcing model, framework and system architecture showing dimensions that affect them and gaps in each one.

**Outsourcing Models**

**Table 2.** Mapping existing Models w.r.t Dimensions

| NO | Dimensions / Models | Strategic | Financial | Capability | Resources | Relationship | Knowledge | Organizational structure | Institutional arrangements | Function characteristics | Management | Security | Performance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | [1] | | | | | ✓ | | | | | | | |
| 2 | [2] | | | ✓ | ✓ | | | | | | | | ✓ |
| 3 | [3] | | | ✓ | | ✓ | | | | | ✓ | | |
| 4 | [4] | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | | |
| 5 | [10] | | | ✓ | | | | ✓ | | | | | ✓ |
| 6 | [11] | | | ✓ | | | ✓ | | | | | | ✓ |
| 7 | [12] | | | ✓ | | ✓ | ✓ | | ✓ | | | | |
| 8 | [13] | ✓ | ✓ | ✓ | | | | | | ✓ | ✓ | | |
| 9 | [15] | ✓ | | ✓ | | ✓ | | | | | ✓ | | ✓ |
| 10 | [16] | | ✓ | ✓ | ✓ | | ✓ | | | | | | |
| 11 | [17] | | ✓ | | | ✓ | ✓ | | | | ✓ | | |
| 12 | [18] | | ✓ | | | | | | | | ✓ | | |
| 13 | [19] | ✓ | ✓ | | | | | | | | | | |
| 14 | [20] | | | ✓ | | | | ✓ | | | | | |
| 15 | [21] | | | ✓ | | | | | | | | | |
| 16 | [22] | | ✓ | ✓ | ✓ | ✓ | | | | | | | |
| 17 | [23] | | ✓ | | ✓ | | ✓ | | | | ✓ | | |
| 18 | [24] | | | | | | | | | | ✓ | | |
| 19 | [25] | ✓ | | ✓ | ✓ | | | | | | ✓ | | |
| 20 | [26] | | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ |
| 21 | [27] | | | | ✓ | | | | | | | ✓ | |

Table 2 illustrates the existing outsourcing models and their mapping with respect to one or more dimensions. In [1], the proposed model determined the factors that positively impact the continuity of their relationship. However, this study has missed other aspects that can influence partnership quality as risk, capability, and resources. In [2], the proposed model is generic and can be extended to different IT outsourcing arrangements. However, they missed other aspects while describing the alternatives as used

resources, cost, and risk management. The model presented in [3], focused on outsourcing in SMEs instead of large enterprises. However, it did not consider financial and strategic dimensions and what factors are needed to determine the capability dimension.

If the proposed model in [4] and software tool are being followed, risks can be mitigated, and the success of the projects is assured. However, they missed how to develop and sustain a long-term relationship between the service provider and client. While in [10], Outsourcing capabilities and organizational structure dimensions are crucial factors in the achievement of quality performance, and that a fit between them is paramount, but missed the risks and cost aspects. Moreover, the model presented in [11] can aid practitioners to determine how to use outsourcing to improve knowledge management, but it depends on limited sample size.

In [12], the authors confirmed that effectively designing work practices and contracts achieve better public-private goals. However, they need to develop more cases in different countries to improve the generalizability of the findings and explore more factors. In [13], the model could be used for a specific maintenance activity in any generic location and specialty. However, they depend on the user to give the relative weight of the factors, which need more experienced users in the outsourcing model context. Meanwhile, in [15], the proposed model was empirically presented and has validated the effects of the three key practices on outsourcing performance. However, other elements that impact performance as advanced technology, financial and knowledge transfer aspects were skipped.

In [16], the model identified the factors that affect the knowledge transfer process in IT outsourcing, but missed other factors, e.g., knowledge integration mechanisms. The presented model in [17], is an effective and efficient decision-making tool for the selection of the best service provider for outsourcing and can be extended to other service sectors. However, it did not consider the reputation of the service provider, experience, resources, and capability dimensions in selecting an appropriate service provider. While in [18], the presented model ensures the efficiency of the IT infrastructure, achieves a high degree of innovativeness of the business and makes use of the resource advantages of service providers.

Meanwhile, in [19], the government not only saves costs but can also keep ahead in the development of IT, while the vendor can acquire returns from the construction and maintenance of the e-government systems. However, the proposed model did not consider risk management. The model in [20], investigated the factors affecting the outsourcing decisions of e-banking services, but the findings cannot be generalized to other industries. While in [21], the authors studied the moderating role of learning capability on the relationship between integration capability and performance in IT outsourcing while prior related studies neglecting this hypothesis. However, it will be more valuable if they can combine the data from both the vendor and their clients.

Meanwhile, in [22], many subcontracting SMEs can internationalize their business if they leverage their resources, capabilities, and customer networks proficiently. In [23], the proposed model is the first to consider subcontracting forms and how they have led to the sustainability of SMEs activities. Meanwhile, in [24], the authors proposed a generic approach, but it is a manual checklist-based method and can become time-consuming. They depend on documents for the assessment process, so problems

can arise if documents are not updated regularly. In [25], the authors addressed the issues concerning outsourcing and reversibility as one unified process while others considered them as opposite phenomena. The key factor for reversibility should be considered and handled properly. Otherwise, reversibility will be difficult to implement.

Meanwhile, in [26], managers used this model to prepare an appropriate interaction design with the representatives to achieve successful outsourcing. While in [27], the proposed OPE model can be implemented by any programming language, and users can define their split methods and encrypt function. It achieved high security. Both [26, 28] did not consider cost management.

The models were validated in different approaches: either by a questionnaire [1, 3, 4, 10, 13, 15–17, 23, 26], using a case study [2, 4, 12, 13, 17, 24, 27], a survey [11, 20–23] , or an experiment [27]. All the models presented in [16, 18, 19, 26] are dedicated to a specific sector, they are not considered generic models.

**Outsourcing Frameworks**

Table 3 illustrates the existing outsourcing frameworks and their mapping with respect to one or more dimensions. In [28], the authors confirmed that strong partnership and goal compatibility can be the foundation of a long-term sustainable relationship. The presented framework in [29] identified the critical success factors for IT outsourcing implementation. Meanwhile, in [30], the authors provide practitioners with pointers on the way to maximize benefits and minimize the obstacles caused by dependency. However, client dependence can affect other aspects as vendor performance.

**Table 3.** Mapping existing Frameworks w.r.t Dimensions

| NO | Dimensions / Frameworks | Strategic | Financial | Capability | Resources | Relationship | Knowledge | Organizational structure | Institutional arrangements | Function characteristics | Management | Security | Performance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | [28] | | | | | ✓ | | | | | | | |
| 2 | [29] | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | | |
| 3 | [30] | | | | ✓ | ✓ | | | | | | | |
| 4 | [31] | | | ✓ | ✓ | | | | | | | | ✓ |
| 5 | [32] | ✓ | ✓ | | | | | | | | | ✓ | |
| 6 | [33] | ✓ | ✓ | ✓ | ✓ | | | | | | | | ✓ |

In [31], the authors introduced the catalyst role of partnership dynamic capability in transforming IT investments into successful partnership value. However, they did not consider how the interfirm power structure impacts the effects of IT investments. Meanwhile, in [32], the proposed framework reduced time, cost and improve the security of the auditing process. However, they did not consider the confidentiality of the data. The framework in [33], covered different business and IT facets of the enterprise which

empowers the efficiency and achieve the business/IT alignment. It should be applied to other cloud models to find other dimensions and factors to be assured that it is not restricted to one cloud service.

There are several validation techniques to existing frameworks, either by questionnaire [14, 30, 31], prototype [32], or an experiment [32]. Moreover, the proposed frameworks in [28, 29] missed risk management.

**Outsourcing System Architecture**

Table 4 illustrates the existing outsourcing systems architectures and their mapping with respect to one or more dimensions. In [14], the authors proposed a design of a new architecture to achieve the confidentiality and integrity of query results on outsourced data. But they did not state how to optimally deploy these services over the cloud to reduce cost. While in [34] the authors provided optimized business process outsourcing through the CaaS model and enhanced business process deployment. However, they did not consider the integrity of outsourced stored data and did not show how to search and retrieve stored data on the cloud. They validated the proposed system architecture through a case study.

**Table 4.** Mapping existing System Architectures w.r.t Dimensions

| NO | Dimensions / System Architectures | Strategic | Financial | Capability | Resources | Relationship | Knowledge | Organizational structure | Institutional arrangements | Function characteristics | Management | Security | Performance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | [14] | | | ✓ | ✓ | | | | | | | ✓ | |
| 2 | [34] | | ✓ | ✓ | ✓ | | | | | | ✓ | | ✓ |

## 4 Results and Discussions

Fig. 2 shows the total ratio and the number of each dimension that existed in the models, frameworks, and systems architectures. Through investigating the models and frameworks that existed in the literature review, we found 12 dimensions affecting outsourcing success which are strategic, financial, capability, resources, relationship, knowledge, organizational structure, institutional arrangements, function characteristics, management, security, performance. From Fig. 2, we notice that capability, resources, financial and management dimensions have the highest percentages over the other dimensions. Thus, we can consider them the four key players in most models and frameworks.

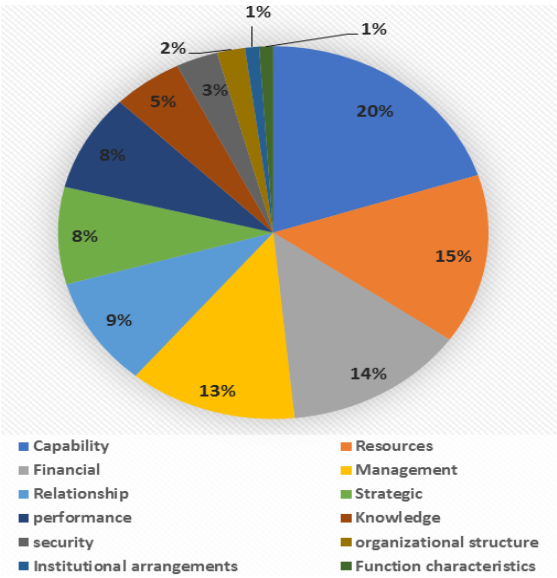


**Fig. 2.** Percentage of each dimension in models, frameworks, and system architectures

Other dimensions have lower percentages due to the context or applicability of outsourcing models and frameworks. For example, the institutional arrangements dimension considers determinants of collaborative interfaces in public-private IT outsourcing relationships [12]. Also, the function/ service characteristics dimension is available in a multi-criteria decision-making model and applied as an approach for maintenance managers to consider before deciding on outsourcing [13]. We conclude that there are some dimensions with the same objective that we can merge them into one dimension like organizational structure, function characteristics and institutional arrangements dimensions. They have the same objectives with the management dimension so we can merge them into one dimension as *management*.

## 5 Conclusion and Future Work

Outsourcing is a common practice in many large organizations around the world. This practice transfers some functions of an organization to external parties for the improvement of the organization's efficiency. Among the most outsourced functions are information system (IS) and information technology (IT) functions. Several factors affect the organization's decision to outsource. After the decision to outsource is taken, an organization must decide on the suitable type of outsourcing model to follow. To achieve this target, we investigate several models, frameworks, system architectures and approaches that help in achieving successful outsourcing.

This research has important theoretical and managerial implications for several research directions. From the theoretical perspective, this research contributes to the out-

sourcing literature by focusing on the main dimensions and their related factors affecting the success of outsourcing models and frameworks. Also, it contributes to the literature by addressing the advantages and limitations of each of them. On the other hand, from the managerial perspective, this research supports managers in different organizations to decide on the suitable type of outsourcing model to follow after the decision to outsource is taken. It also helps end-users in different organizations to select an outsourcing third-party based on their system requirements.

As a result of this research, we can conclude that no outsourcing model or framework considers all the dimensions. Also, there is no consensus regarding the models and dimensions determining outsourcing success. Some dimensions/factors can be added or removed according to the context or environment that we design the model or framework for it. This can be very challenging to achieve successful IS outsourcing with good service quality, minimum cost, time, risks, and effort through the application of a comprehensive model or framework. For future work, we aim to create an enhanced and integrated outsourcing model to consider the available models and frameworks.

## References


[1] Y. Y. Wibisono, R. Govindaraju, D. Irianto, and I. Sudirman, "Managing Differences, Interaction, and Partnership Quality in Global Inter-firm Relationships: An empirical Analysis on Offshore IT Outsourcing," *Int. J. Manag. Proj. Bus.*, vol. 12, no. 3, pp. 730–754, Sep. 2019, doi: 10.1108/IJMPB-04-2018-0074.

[2] D. C. Morais, A. P. C. S. Costa, and A. T. de Almeida, "Group Decision Model for Outsourcing IT Services," *Procedia Technol.*, vol. 16, pp. 562–568, 2014, doi: 10.1016/j.protcy.2014.10.004.

[3] A. K. Hamzah, "A Review of IT Outsourcing Relevant and Success Determinants and A Proposed Model," *Journal of Advanced Computer Science and Technology Research*, vol. 3, p. 18, 2013.

[4] S. H. M. Kazmi, Y. Hafeez, and S. Ali, "Software Outsourcing Model for Risk Mitigation," *2018 International Conference on Computing, Mathematics and Engineering Technologies – iCoMET 2018*, p. 11, doi: 10.1109/ICOMET.2018.8346317.

[5] M. Akbari and J. L. Hopkins, "The Changing Business Landscape in Iran: Establishing Outsourcing Best Practices," *Oper. Supply Chain Manag. Int. J.*, pp. 184–197, Sep. 2016, doi: 10.31387/oscm0250172.

[6] S. Somjai, "Advantages and Disadvantages of Outsourcing," vol. 9, no. 1, p. 4, 2017.

[7] M. Shumanskaya, "Improvement of Outsourcing Information Technology Services from Other Countries to Finland," p. 49, 2011.

[8] L. Vural, "Success Factors in Public Information Systems Outsourcing: A Case Study," vol. 19, no. 1, p. 107, 2004.

[9] S. M. Sabri, R. Sulaiman, A. Ahmad, and A. Y. Tang, "A Comparative Study on IT Outsourcing Models for Malaysian SMEs E-business Transformation," *ARPN Journal of Engineering and Applied Sciences*, vol. 10, no. 23, p. 8, 2015.

[10] A. Plugge, H. Bouwman, and F.-J. Molina-Castillo, “Outsourcing Capabilities, Organizational Structure and Performance Quality Monitoring: Toward A Fit Model,” *Inf. Manage.*, vol. 50, no. 6, pp. 275–284, Sep. 2013, doi: 10.1016/j.im.2013.04.006.

[11] T. S. H. Teo and A. Bhattacherjee, “Knowledge Transfer and Utilization in IT Outsourcing Partnerships: A Preliminary Model of Antecedents and Outcomes,” *Inf. Manage.*, vol. 51, no. 2, pp. 177–186, Mar. 2014, doi: 10.1016/j.im.2013.12.001.

[12] F. B. Duhamel, I. Gutiérrez-Martínez, S. Picazo-Vela, and L. Luna-Reyes, “Determinants of Collaborative Interfaces in Public-Private IT Outsourcing Relationships,” *Transform. Gov. People Process Policy*, vol. 12, no. 1, pp. 61–83, Mar. 2018, doi: 10.1108/TG-07-2017-0042.

[13] M. A. Hassanain, S. Assaf, A.-M. Al-Hammad, and A. Al-Nehmi, “A Multi-Criteria Decision Making Model for Outsourcing Maintenance Services,” *Facilities*, vol. 33, no. 3/4, pp. 229–244, Mar. 2015, doi: 10.1108/F-01-2013-0003.

[14] M. Rady, T. Abdelkader, and R. Ismail, “Integrity and Confidentiality in Cloud Outsourced Data,” *Ain Shams Eng. J.*, vol. 10, no. 2, pp. 275–285, Jun. 2019, doi: 10.1016/j.asej.2019.03.002.

[15] S. M. Handley and W. C. Benton, “Unlocking the Business Outsourcing Process Model,” *J. Oper. Manag.*, vol. 27, no. 5, pp. 344–361, Oct. 2009, doi: 10.1016/j.jom.2008.11.002.

[16] N. H. Arshad, R. Hanapi, and N. Buniyamin, “IT Outsourcing and Knowledge Transfer in Malaysia,” in *2010 2nd International Congress on Engineering Education*, Kuala Lumpur, Malaysia, Dec. 2010, pp. 16–21, doi: 10.1109/ICEED.2010.5940756.

[17] C.-C. Hsu and J. J. H. Liou, “An Outsourcing Provider Decision Model for the Airline Industry,” *J. Air Transp. Manag.*, vol. 28, pp. 40–46, May 2013, doi: 10.1016/j.jairtraman.2012.12.009.

[18] L. A. Sosunova, I. V. Yakhneeva, and A. N. Agafonova, “Outsourcing Model Evaluation for Business Process Management in Digital Economy,” *Mediterr. J. Soc. Sci.*, Nov. 2015, doi: 10.5901/mjss.2015.v6n6s3p328.

[19] J. Lu, W. Zhong, and S. Mei, “BOO Model for Outsourcing E-Government Services,” *Syst. Eng. - Theory Pract.*, vol. 29, no. 4, pp. 75–80, Apr. 2009, doi: 10.1016/S1874-8651(10)60016-6.

[20] P. Hanafizadeh and A. Zare Ravasan, “An Empirical Analysis on Outsourcing Decision: The Case of E-Banking Services,” *J. Enterp. Inf. Manag.*, vol. 31, no. 1, pp. 146–172, Feb. 2018, doi: 10.1108/JEIM-11-2016-0182.

[21] M.-M. Wang and J.-J. Wang, “How Vendor Capabilities Impact IT Outsourcing Performance: An Investigation of Moderated Mediation Model,” *J. Enterp. Inf. Manag.*, vol. 32, no. 2, pp. 325–344, Apr. 2019, doi: 10.1108/JEIM-07-2018-0167.

[22] J. Kim and M. Hemmert, “What Drives the Export Performance of Small and Medium-Sized Subcontracting Firms? A Study of Korean Manufacturers,” *Int. Bus. Rev.*, vol. 25, no. 2, pp. 511–521, Apr. 2016, doi: 10.1016/j.ibusrev.2015.09.002.

[23] C. Nwankwo, “The Effects of Subcontracting Forms on the Sustenance of SMEs,” *World Journal of Entrepreneurship, Management and Sustainable Development*, vol. 15, no. 4, p. 15, 2019, doi: 10.1108/WJEMSD-01-2019-0006.

[24] K. Kaur and R. Sharma, “Critical: Threat Model for an Outsourcing Business,” in *2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT)*, Delhi, Jul. 2017, pp. 1–5, doi: 10.1109/ICCCNT.2017.8204093.

[25] W. Al-Ahmad and A. Al-Oqaili, “Towards a Unified Model for Successful Implementation of Outsourcing and Reversibility of Information Systems,” *J. King Saud Univ. - Comput. Inf. Sci.*, vol. 25, no. 2, pp. 229–240, Jul. 2013, doi: 10.1016/j.jksuci.2013.03.003.

[26] C. Sanchis-Pedregosa, J. A. D. Machuca, and M.-M. González-Zamora, “Determinants of Success in Transport Services Outsourcing: Empirical Study in Europe,” *International Journal of Logistics Management*, vol. 29, no. 1, p. 33, 2018, doi: 10.1108/IJLM-09-2016-0207.

[27] Z. Liu, X. Chen, J. Yang, C. Jia, and I. You, “New Order Preserving Encryption Model for Outsourced Databases in Cloud Environments,” *J. Netw. Comput. Appl.*, vol. 59, pp. 198–207, Jan. 2016, doi: 10.1016/j.jnca.2014.07.001.

[28] S. S. Chaurasia, “I Can’t but We Can!: Impact of Goal Compatibility on Value Co-creation in Retailer–Manufacturer Outsourcing Relationship,” *J. Glob. Oper. Strateg. Sourc.*, vol. 11, no. 1, pp. 123–144, Feb. 2018, doi: 10.1108/JGOSS-04-2017-0010.

[29] Zhang Pei, Zeng Zhen-xiang, and Huang Chun-ping, “A Framework for IT Outsourcing Decision Process,” in *2008 International Conference on Service Systems and Service Management*, Melbourne, Australia, Jun. 2008, pp. 1–4, doi: 10.1109/ICSSSM.2008.4598453.

[30] S. Gopalakrishnan and H. Zhang, “Client Dependence: A Boon or Bane for Vendor Innovation? A Competitive Mediation Framework in IT Outsourcing,” *J. Bus. Res.*, vol. 103, pp. 407–416, Oct. 2019, doi: 10.1016/j.jbusres.2017.12.023.

[31] K.-H. Chang, Y. Chen, and H.-F. Huang, “Information Technology and Partnership Dynamic Capabilities in International Subcontracting Relationships,” *Int. Bus. Rev.*, vol. 24, no. 2, pp. 276–286, Apr. 2015, doi: 10.1016/j.ibusrev.2014.08.003.

[32] W. Guo *et al.*, “Outsourced Dynamic Provable Data Possession with Batch Update for Secure Cloud Storage,” *Future Gener. Comput. Syst.*, vol. 95, pp. 309–322, Jun. 2019, doi: 10.1016/j.future.2019.01.009.

[33] M. Rekik, K. Boukadi, and H. Ben-Abdallah, “A Comprehensive Framework for Business Process Outsourcing to the Cloud,” in *2016 IEEE International Conference on Services Computing (SCC)*, San Francisco, CA, Jun. 2016, pp. 179–186, doi: 10.1109/SCC.2016.30.

[34] K. Boukadi, R. Grati, M. Rekik, and H. Ben-Abdallah, “Business Process Outsourcing to Cloud Containers: How to Find the Optimal Deployment?” *Future Gener. Comput. Syst.*, vol. 97, p. 12, 2019, doi: 10.1016/j.future.2019.02.069.