

Exploiting resources and capabilities of the IT-department in a SaaS-environment

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Abstract

In a period where digitization rapidly influences the corporate world, Cloud Computing (CC) has emerged over the past years as well. CC refers to offering hardware, software, and data by a provider over a network and can benefit organizations enormously regarding cost efficiency, operational excellence, and innovation. Software-as-a-Service (SaaS), a delivery model of CC, allows organizations to deploy and use complete applications over the internet, which are managed by an external provider. The use of SaaS can bring firms several benefits, such as scalability, transparency of costs, access to high-end applications, and avoidance of up-front costs. However, it is unclear how the migration to SaaS impacts the IT-department on an organization level, and how IT-departments should adapt to perform in a SaaS-environment. This research contributes to this knowledge gap by investigating which resources and capabilities of the IT-department should change for the IT-department to perform. Propositions were formulated based on a literature research and a questionnaire, and empirical data was collected by means of a case study research. The results show that financial assets, technological tools, organizational structure, management systems, skills, knowledge, organizational culture, contractual governance, and relational governance are important resources of the IT-department, that should change in order to perform. The insights gained from this study can support organizations' decision-makers improving the organization of the IT-department when migrating to a SaaS-environment.

Key words: SaaS, IT-department, Resource-Based View of the Firm, organizational change, resources, capabilities, migration

1. Introduction

Cloud Computing (CC) is being increasingly adopted by firms for outsourcing of computing resources and related tasks. The use of Cloud Computing can provide infinite resources for the firm and allows firms to order required computing resources on demand. Moreover, it allows firms to increase the use of computing resources when necessary, so no up-front costs are involved. Further, firms can use and release resources only when needed, allowing them to get rid of unnecessary hardware, software, and jobs [1]. Although the use of CC can bring many benefits, risks are involved as well. One of those risks is related to the impact that this disruptive technology can have on the organization of the IT-department. In literature, research has been done on the effect of Cloud-migration on the functionality of the IT-department [2]–[7]. However, these studies lack generalizability. Within the concept of CC, different service models and deployment models exist, which refer to the type of service that is offered and the way how this service is deployed. In these studies, no differentiation has been made between the service models and deployment models that exist, when assessing the effect of CC on the IT-department. Further, there is a lack of cross-industrial research on this subject in literature. In this study, the effect of the Cloud service model Software-as-a-Service (SaaS) on the organization of the IT-department of large firms will be examined. The use of SaaS allows organizations to deploy and use complete applications over the internet, which means that the installation of physical hardware or software is not necessary. How the organization of the IT-department exactly changes in a SaaS-environment and how IT-departments should adapt to perform in a SaaS-environment is not yet defined in literature. Hence, the aim of this study is to define the changes that occur within the IT-department on organizational level and how the IT-department should adapt to keep performing.

This paper addresses the impact that the migration to a

SaaS-environment has on the IT-department and how the IT-department should adapt to these changes, by formulating a set of propositions concerning these changes based on literature research and conducting questionnaires with Cloud-experts. Then, a multiple-Case Study Research (CSR) is performed on three organizations to collect empirical data. The findings of the CSR will be analyzed by using a method called *pattern matching*, in which the empirical findings will be compared with the formulated propositions.

This paper exists out of six sections. In the following section, the concepts of Cloud and SaaS and the involved challenges are explained. In Section 3, a theoretical framework is developed, and the propositions are formulated. The methodology used for collecting the data is elaborated on in Section 4, followed by the empirical findings in Section 5. This paper will be finalized with a conclusion and recommendations for future research in Section 6.

2. Cloud and SaaS

As mentioned in Section 1, CC is an enormously popular technology amongst firms. So, what exactly is CC? As this concept has been studied by many researchers, several definitions exist in literature [3], [8], [9]. It is important to give a clear definition of what CC is, in order to lay a good foundation for the rest of this research. A definition used in many studies is that of the U.S. National Institute of Standards and Technology (NIST) [10]:

“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

According to NIST, CC has five essential characteristics [10]. Firstly, CC allows *on-demand self-service*. Computing resources are unilaterally available for the Cloud-user and can be provided without the need for human interaction. Secondly, CC provides *broad network access*, because the computing resources are provided over the internet and can be accessed from multiple devices (such as laptops, tablets, and mobile phones). Thirdly, CC allows for *pooling of resources*, which refers to the ability to pool computing resources and serving multiple customers by using a multi-tenant model. Fourthly, *rapid elasticity* is provided by using CC, which means that users have the ability to use the computing resources offered by the vendor at any point in time. Lastly, CC offers a *measured service*, which refers to the fact that the use of computing resources can be controlled, monitored, and reported to the consumer.

A distinction can be made in the way the Cloud-service is provided by the vendor, called deployment models. Three major deployment models exist: Public Clouds, Private Clouds and Hybrid Clouds [9].

- *Public Cloud*: the computing resources and services are provided and managed by a Cloud-vendor, available for multiple tenants and the tenants normally pay per use.
- *Private Cloud*: the Cloud-service is developed and formed to the needs of one tenant and can be fully controlled by the tenant itself or by an external organization.
- *Hybrid Cloud*: a combination of Private and Public Cloud. some parts of the computing resources are deployed on a Public Cloud, and some on a Private Cloud, to eliminate shortcomings and limitations of each approach.

Using Public Cloud forces organizations to give away (part) of the control over the IT-infrastructure to the Cloud-provider, and can therefore cause significant changes in the business processes of the Cloud-user [9]. Consequently, this can have large implications on the organization of the IT-department and how the IT-department operates. Therefore, Public Cloud is chosen as the deployment model to be studied in this research. Hence, if the term CC or SaaS is used further on in this research, it refers to the use of a Public Cloud.

The degree of customization of the provided Cloud-service can be distinguished by three main types, called service models: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) [9]. Although overlap can exist between the three models, and there are no crisp lines that distinguish them [1], it is possible to explain the differences in a concise way.

- *IaaS*: provision of infrastructural resources via the Cloud. The operating system, middleware, runtime, servers, and virtualization are outsourced and managed by a vendor.
- *PaaS*: provision of platform services via the Cloud, which can be used by developers to build applications without worrying about the underlying infrastructure.
- *SaaS*: provision of on-demand business applications via the Cloud. The complete application is managed and maintained by the vendor.

Because SaaS allows the vendor to manage and control the complete application and the underlying infrastructure, a large part of the responsibilities regarding the management of IT moves to the vendor. Consequently, this can have an impact on the organization of the IT-department. Therefore, this research focuses on the impact of SaaS on the organization of the IT-

department. In the following paragraph, a more elaborate definition of SaaS will be given.

2.1 SaaS

As mentioned before, SaaS allows users to deploy and use applications over the internet, so there is no need for the installation of physical hardware or software. Run from an internet browser, applications can be accessed through web-based interfaces. The complete application is provided by the Cloud-vendor, which means that monitoring, maintenance, and solving issues is on the account of the vendor. Moreover, the vendor provides systemic support of the SaaS-application, instead of updating the software and fixing issues on a yearly basis [11]. The use of SaaS has become increasingly popular in businesses, due to the unique characteristics that SaaS-applications have. To give a better picture of how SaaS differs from the regular 'on premise' model, some of the most important characteristics of SaaS will be discussed below. SaaS has a different business model than 'on-premise' software. The user only pays if the software is required and used, called the pay-as-you-use model [11]. Instead of paying for licensing, installing and maintaining software, SaaS-applications are typically sold by subscription. Therefore, the user is flexible and can stop the subscription at any time. Moreover, SaaS-users have the option to share the application with other users or use the application privately and don't share information and data. For example, *Salesforce*, a well-known SaaS-application, allows customer relationship management with customers and partners from one central platform. This means that the application can be used simultaneously with multiple users. Another characteristic of SaaS is that users can benefit from the newest technological innovations of the vendor, without being disrupted by updates and upgrades. These are automatically performed by the vendor, without disrupting the business processes of the user. Moreover, the user is not accountable for the costs related to updates and upgrades. Table 1 shows an overview of the most important benefits and risks involved with the use of SaaS.

Table 1. Risks and Benefits of SaaS

Benefits of SaaS	Risks of SaaS
<ul style="list-style-type: none"> ○ No need for software expertise ○ Allows the use of new, high-end applications ○ Scalability of the application ○ Transparency of costs ○ No up-front costs ○ Instant access to the application 	<ul style="list-style-type: none"> ○ Confusing price rates ○ Dependency on SaaS-provider ○ Dependency on internet connection ○ Security and privacy risks ○ No control over functionality of application ○ Interoperability issues ○ Change of functionality of IT-department

One of the challenges regarding the use of SaaS is that the functionality of the IT-department might change. Due to outsourcing of the underlying infrastructure, many responsibilities of the IT-department shift towards the vendor [6], [12]. The migration to SaaS might lead to shrinking of the IT-department, need for different skills and knowledge, and a shift from IT-maintenance towards vendor management [2], [6], [12]. To perform well and keep thriving in a Cloud-environment, the organization of the IT-department should change and adapt the overall strategy [13]. So, how should the organization of the IT-department change in a SaaS-environment in order to keep thriving?

3. Theoretical Background

To help to identify what changes can occur within the organization of the IT-department when migrating to SaaS, a theoretical framework is developed. The theoretical framework of this study is based on the Resource-Based View of the Firm (RBV), which is a perspective that sees the firm as a complex bundle of *resources* and *capabilities*. According to the RBV, internal firm-specific resources and capabilities are the most important assets of an organization to perform and ensure competitive advantage [14]. Hence, the RBV looks into how firms succeed or fail in the marketplace from an ‘inside out’ perspective, which refers to the idea that internal resources and capabilities should be exploited to succeed. According to Barney [14], three types of *resources* can be distinguished within the firm: physical resources (e.g., physical, financial, technological, plant or equipment), human resources (e.g., training, skills, experiences or insights) and organizational resources (e.g., formal structure, planning). *Capabilities* are necessary to ‘transform’ these resources into value for the firm and can be seen as the capacity of a firm to deploy resources [15].

The RBV is chosen as the underlying theory of this study, because it helps to understand how resources and capabilities should be used in order to increase business performance [16]. As the organization of the IT-department might change when migrating to SaaS, the RBV could help to identify what resources and capabilities of the IT-department change and should be exploited to sustain performance in a SaaS-environment.

To identify what resources and capabilities of the IT-department might change and should be exploited when migrating to a SaaS-environment, an extensive literature research is conducted. Moreover, a questionnaire is conducted with 5 Cloud-experts from Accenture, the IT-consultancy firm involved in this study, to validate the resources and capabilities found in literature. The literature research and expert questionnaires resulted in the identification of the following resources and capabilities of the IT-department that might change and should be exploited to perform when migrating to a SaaS-environment.

- *Physical resources*: financial assets.
- *Organizational resources*: organizational structure and management systems.
- *Human resources*: skills, knowledge, training, organizational culture.
- *Capabilities*: contractual governance and relational governance.

Based on these findings, one or more propositions are formulated for each resource and capability. In the following paragraphs, the identification of each resource and capability is elaborated on and the propositions are formulated. The final theoretical framework is showed in Figure 1.

3.1 Financial Assets

Cost reduction is one of the reasons why companies choose to migrate to SaaS-applications. IT-departments can get rid of unnecessary hardware and software, since the cloud vendor takes over this responsibility. Hence, this can lead to lower capital costs. Furthermore, the operational costs of the IT-department could decrease, because maintenance and other responsibilities are taken over by the vendor. So, SaaS-

migration could lead to a decrease of direct costs for the IT-department [4], [17]. Moreover, the total cost of ownership for SaaS-applications are significantly lower compared to on-premise applications [18]. If this line of reasoning is followed, it could be concluded that fewer financial assets are needed in a SaaS-environment. However, this line of reasoning is too straightforward. Studies have argued that the migration to Cloud causes and requires big changes in the organization of the IT-department, such as re-training of IT-employees [3]. Consequently, this re-organization of the IT-department can initially involve higher costs. Hence, the following propositions are formulated:

P1: The IT department will require extra financial assets when migrating to a SaaS-environment, due to re-organization.

P2: The operational costs of the IT-department will decrease over time when migrating to a SaaS-environment.

3.2 Organizational Structure

Formal organizational structure, or simply organizational structure, is one of the organizational resources that should be exploited to improve the firm’s performance [16]. Structure refers to the hierarchical arrangement of relationships between different jobs and functions within the organization. In other words, it defines and assigns competencies, roles, and responsibilities, and clarifies who reports to whom. In organizations, having a clear organizational structure is important when managing multiple employees, because it unites activities, processes, and people and sets common goals. Firms should not underestimate the importance of organizational structure, as it is a crucial element in the diffusion of technological innovation within the organization [19]. Therefore, it can be stated that defining the right organizational structure of the IT-department is necessary when migrating to a SaaS-environment.

Willcocks et al. [12] argue that roles and responsibilities within the IT-department can change after a migration to the Cloud. The authors claim that the number of employees in the IT-department will shrink, but that the quality of these employees should significantly increase. Due to the shift of many tasks and responsibilities to the Cloud-vendor, fewer employees could be needed in the IT-department. On the other hand, new roles and responsibilities can arise to keep up with the new technology [3]. So, the following propositions are formulated:

P3: The size of the IT-department will decrease when migrating to a SaaS-environment.

P4: The IT-department requires highly skilled employees that are able to handle new roles and responsibilities when migrating to a SaaS-environment.

3.3 Management Systems

To ensure that firms can fulfill the tasks required to achieve its objectives, management systems are used. The set of policies, processes, and procedures used by the organization to achieve these goals can be seen as management systems. Cloud-migration can cause a change in the objectives and goals of the IT-department, as the function of the IT-department could shift towards managing the vendor and business analytics [2], [4], [13]. Consequently, this could cause management systems to be re-designed to adapt to the new goals and objectives of

the IT-department in a SaaS-environment. Hence, the following proposition is formulated:

P5: Management systems of the IT-department require re-design when migrating to a SaaS-environment, due to new objectives and goals.

3.4 Skills

Skills is one of the human resources that should be exploited by the firm in order to perform and gain competitive advantage [14]. Skills can be defined as the ability to apply knowledge in context and getting the expected results out of this. Without skills, employees will not be able to transform the knowledge they have into a desirable result. So, it is essential for firms to exploit and keep developing skills of their employees. Moreover, with the emergence of new technologies within firms, new skills are needed. Al-lawati & Al-Badi [3] argue that the migration to the Cloud requires new skills for the employees of the IT-department, to keep up with the new technology. Also, 'soft skills' across all roles can be required within the IT-department due to Cloud-migration [12]. Al-lawati & Al-Badi [3] and Ecar [20] argue that there is a shift from 'hard skills' like maintenance of hardware to business analytics and strategic planning ('soft skills'). Hence, the following proposition is formulated:

P6: IT-employees require a new set of 'soft' skills when migrating to a SaaS-environment.

3.5 Knowledge

In current literature, knowledge is broadly defined. There is not one specific definition of knowledge, and the definition of what knowledge is has intrigued many researchers and philosophers in history. Grant [21] makes a distinction between tacit and explicit knowledge. Tacit knowledge refers to knowing how and is revealed through its application. Therefore, skills (mentioned in the previous paragraph) can be seen as tacit knowledge. On the other hand, explicit knowledge refers to knowledge about facts and information and is revealed by its communication. In this study, the term knowledge refers to explicit knowledge. Explicit knowledge can be transferred between employees more easily than tacit knowledge. The ease of communication is a fundamental property of explicit knowledge.

IT-employees are knowledge-workers; to perform and succeed in doing their job, employees should have enough knowledge. They should know how the IT-operation of the firm works and how to solve problems if these occur. Moreover, knowledge is one of the most important resources within the firm [22]. Al-lawati & Al-Badi [3], Ecar [20] and Willcocks et al. [12] argued that a large shift in skills arises within the IT-department after Cloud-migration. Consequently, IT-employees should acquire new knowledge to be able to cope with the new technology and gain new skills. Hence, the following proposition is formulated:

P7: IT-employees require other knowledge when migrating to a SaaS-environment.

3.6 Training

Training of employees is essential in organizations. By training, employees can gain new skills, knowledge, insights, and experiences to improve performance in their roles and keep up with new trends within the organization and market. Moreover, training can positively affect employee motivation and

commitment [23], [24]. Hence, training of employees is important for the overall performance of the firm. Coping with a disruptive technology such as SaaS could require training. As mentioned in the previous two paragraphs, SaaS-migration could lead to the need for the acquirement of new skills and knowledge of the IT-employees of the firm. By training IT-employees, new skills and knowledge can be acquired that are required when migrating to a SaaS-environment. Hence, the following proposition is formulated.

P8: IT-employees require training to acquire new skills and knowledge when migrating to a SaaS-environment.

3.7 Organizational Culture

Madhani [16] stresses organizational culture as one of the human resources of the firm that should be exploited to gain competitive advantage. Hall [25] defines culture as follows: "Culture constitutes the beliefs, knowledge, attitudes of mind and customs to which individuals are exposed in an organization, as a result of which they acquire a language, values, habits of behavior and thought." Moreover, organizational culture can be seen as the product of beliefs of the firm's management. Few studies have been conducted on the effect of SaaS-migration on the organizational culture of the firm. However, it can be assumed that changes in organizational culture occur due to migration to a SaaS-environment. For example, Khajeh-Hosseini, Greenwood, & Sommerville [6] argue that the use of SaaS-application can cause a decrease in job satisfaction of employees of the IT-department. So, it could be stated that a change in organizational culture could be required to resolve this. Even more, when using new technologies, organizations should create a culture within the firm that thrives on change [26]. Hence, the following proposition is formulated:

P9: The IT-department requires a different organizational culture when migrating to a SaaS-environment, to cope with the decrease in job satisfaction.

3.8 Contractual Governance

When companies decide to migrate to a SaaS-environment, they should find a suitable Cloud vendor for the providing of the desired application. The user and the vendor negotiate and discuss what both parties expect from the collaboration and set up a contract. Most of the times in CC, such contracts are in the form of a Service Level Agreement (SLA), which are explicit statements of obligations and expectations that exist in the business relationship between a service customer and a service provider [27]. For the Cloud-user, it is important to manage the SLA and clarify what is expected from both parties in the agreement, in order to gain protection against opportunism. If one of the parties violates the rules in the SLA, the level of trust between the parties can significantly decrease, which could lead to catastrophic issues in the collaboration [28]. Therefore, it is crucial to manage and govern these contracts to ensure good collaboration between Cloud-user and Cloud-provider. Qian & Palvia [2] argue that the migration to CC in general, causes the focus of the IT-department to shift towards vendor performance and contract management. From this, it can be concluded that contractual governance could be an important capability within the IT-department when migrating to SaaS, where contractual governance refers to safeguarding the exchange between user and provider through formal contracts. Hence, the following proposition is formulated:

P10: The IT-department requires contractual governance when migrating to a SaaS-environment, to safeguard good collaboration with the vendor.

3.9 Relational Governance

Although contractual governance aims to safeguard the collaboration and relationship between Cloud-user and Cloud-provider, it does have some limitations. Formal contracts may be costly and inefficient, so companies should also make use of other organizational institutions to protect valuable knowledge [29]. Due to the limitations and rigidity of contractual governance, firms require another type of governance: relational governance. Relational governance can be defined as governing transactions between user and provider through social processes and norms. According to Poppo, Zhou, & Zenger [30], successful relational governance can be achieved by cooperation, trust, open communication, sharing of information, and dependence. When migrating to SaaS and thus setting up an SLA between the user and the vendor, relational governance could be of great importance to fill the gap where contractual governance comes short. Literature shows that SaaS-migration can cause a large shift within the IT-department towards relational governance with the Cloud-vendor and towards focusing on managing the relationship with different vendors [2], [4]. Hence, the following proposition is formulated:

P11: The IT-department requires relational governance when migrating to a SaaS-environment, to maintain a good relationship with the Cloud-vendor.

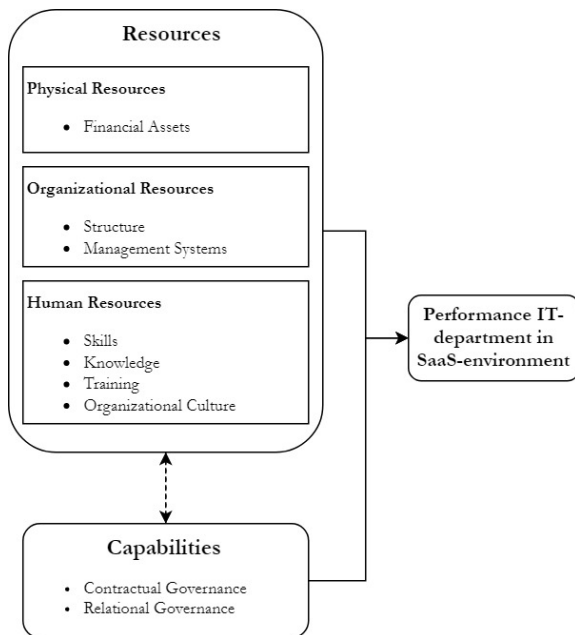


Figure 1. Theoretical Model

3.10 Theoretical Framework

The model in Figure 1 indicates the types of resources within the IT-department that could change due to SaaS-migration. Furthermore, it shows the relation between these resources and the performance of the IT-department. However, the relation with gaining competitive advantage due to better performance of the IT-department is kept out of the scope of this study,

because this study only aims to study how to improve the performance of the IT-department by means of exploiting resources and capabilities. This theoretical model forms the theoretical basis for conducting the case study.

4. Methodology

A Case Study Research (CSR) is performed to collect empirical data regarding the impact of SaaS-migrations on the organization of the IT-department. The CSR is designed and conducted according to the CSR principles of Yin [31]. At three large organizations, interviews are conducted with IT-employees with different functions and backgrounds. The studied organizations operate in three different sectors (chemical, food production, and financial sector) and have migrated to a SaaS-environment in the past year. At each case, approximately three IT-employees were interviewed. Moreover, the SaaS-applications that were implemented varied in functionality and size, to increase the generalizability of the results. The propositions formulated earlier, direct attention to important matters that should be explored within the boundaries of the research. During the interviews, the interviewees are asked if they experienced changes within IT-department related to each of the resources. Moreover, they are asked for their opinion on how each of these resources should ideally be exploited when migrating to a SaaS-environment. Further, company documents are analyzed to get a better insight into the functionality of the IT-department and the SaaS-migration. Finally, a cross-case analysis is performed on the findings of the case study. The results of this cross-case analysis are compared with the propositions formulated earlier, which resulted in some interesting insights related to each of the resources and capabilities. The empirical findings were validated by conducting two evaluation interviews with Cloud-experts from Accenture.

Table 2. Case overview

Case	Sector	Application	Interviewees
1	Chemical	3 Small applications	3
2	Food Production	1 large CRM-application	3
3	Financial	1 large HR-application	2

5. Empirical Findings

In this section, the empirical findings for each of the discussed resources and capabilities are discussed. Moreover, an elaboration is given on the comparison with the propositions formulated earlier. During the case study, one additional type of resource was identified that can increase the performance of the IT-department when migrating to a SaaS-environment: *technological tools*.

5.1 Financial Assets

From the case study, it came forward that during the migration to SaaS the total costs for the IT-department increased. Mainly, this was due to double licensing costs, which refer to the costs that are made for using the old 'on premise' application and the new SaaS-application that is being implemented. Furthermore, additional resources such as external SaaS-migration consultants and extra IT-capacity were needed to facilitate the migration. To keep these costs during the migration as low as possible, the time required to migrate should be minimized.

Therefore, it is important to clearly communicate deadlines regarding the migration within the IT-department to avoid miscommunication. Also, a structured planning should be made upfront with the SaaS-provider and progression should be reported to avoid unplanned costs. So, it can be concluded that during the migration to a SaaS-environment, the total costs for the IT-department will indeed increase and extra financial assets are required. However, in contrast to what is stated in proposition P1, the need for extra financial assets are not due to the re-organization of the IT-department, but is caused by double licensing costs and costs related to additional resources.

In the first case, it came forward that the operational costs of the IT-department after the migration decreased, because the capacity planning was outsourced, and costs of the IT-operation and support costs were lower. However, in the other two cases, the conclusion was made that the costs of the IT-operation did not specifically decrease. Even more, the operational costs of the IT-department in the second case were higher than before, due to technical implications and workarounds that were necessary to keep the operation running. Afterwards, the costs decreased but were not lower compared to before the migration. The reason for this was that the goal of the SaaS-migration was not to reduce the costs of the IT-operation, but to improve the efficiency of the business processes covered by the application. Moreover, due to the outsourcing of the IT-infrastructure when migrating to SaaS, a large part of the data centers became unnecessary. These data centers need to be maintained and take up extra space, which involves extra costs. So, these additional costs should be covered, and unnecessary hardware should be avoided. Hence, the findings of the case study disprove proposition P2; the use of SaaS does not lead to lower operational costs of the IT-department. Although one case experienced a decrease in operational costs, in the other two cases no significant changes were noticed. It should be mentioned that cost reduction was not the reason for migrating to SaaS within these cases. So, the impact of the use of SaaS-applications on operational costs is largely dependent on the reason for using SaaS.

Besides the findings on the propositions mentioned above, other interesting factors related to financial assets have been found in the case study that can positively affect the performance of the IT-operation in a SaaS-environment. First of all, the costs of the migration and the use of the SaaS-application should be transparent for the IT-employees. This way, all employees of IT-department are aware of the extra costs that are involved with a SaaS-migration and thus be able to guide the expenses of the migration in a good direction. Moreover, to reduce the costs of the IT-department, the IT-helpdesk can be offshored to a location where labor costs are lower. Because SaaS-applications do not need physical maintenance, there is no longer a need for a physical help-desk. Further, the SaaS-provider with the lowest operational costs could be chosen to keep the costs as low as possible. Nevertheless, it should be emphasized that the quality of the application is more important than the costs.

5.2 Technological Tools

It came forward that some tools could be introduced to improve the performance of working with SaaS-applications. First of all, it was mentioned that smart alerts should be installed in the new system, that can proactively give a sign when an issue related to the SaaS-application occurs. This way,

IT-employees can efficiently react and solve the issue or, if necessary, contact the vendor. Second, it was recommended when using large SaaS-applications to create a central dashboard that monitors all the applications in the new system simultaneously. This way, the IT-department has a clear and structured overview of the applications and how they function.

5.3 Organizational Structure

None of the interviewees in the case study experienced a reduction of the size of the IT-department after the migration to SaaS. Although it was argued that in all cases that certain functions became unnecessary, the IT-department did not shrink. Due to outsourcing of the infrastructure and development of applications, most tasks for infrastructure managers and developers shifted towards the SaaS-provider. But still, these employees kept their position in the IT-department, albeit in another role. Nevertheless, it was argued that on the long term, the possibility employees leaving the IT-department existed. A yearly 'clean-up' can be organized to assign new tasks to employees that have insufficient workload. Though, if no tasks exist for these employees, they should leave the IT-department or even the organization. Hence, it can be concluded that on short term, the size of the IT-department does not decrease after migration to a SaaS-environment, which disproves P3. However, on long term, some employees within the IT-department may become obsolete, due to the lack of available functions.

The findings of the case study showed that there is a large shift in the roles and responsibilities of IT-employees when migrating to a SaaS-environment. A significant change that was mentioned in all the cases, was the shift from 'technical' operations and maintenance tasks to 'functional' tasks. Maintenance of the technical layer of the applications is unnecessary in a SaaS-environment, because these tasks are the responsibility of the SaaS-provider. Therefore, IT-employees will focus more on the functionality of the application, which refers to how the application performs as a business solution. Another transition that came forward in the cases, was that tasks related to the development and design of applications disappear in a SaaS-based IT-department. On the other hand, roles related to the integration of SaaS-applications with the rest of the IT-landscape and procurement become more important in the IT-department. Since the skills needed for development and design are similar to those needed for integration, it is recommended to assign integration tasks to those IT-employees who used to focus on development and technical maintenance. Moreover, the results indicated that the roles and responsibilities of the IT-department should be transformed to work with *DevOps*, and be able to work with changes quickly. *DevOps* is a way working that combines operations and development and refers to delivering products in a flexible, timeboxed, iterative approach. It was noticed that, during the migration and after the migration, working in a *DevOps* setting significantly changed the roles and responsibilities of the IT-employees. Altogether, it can be concluded that the IT-department does indeed require highly skilled employees that are able to handle new roles and responsibilities after a SaaS-migration, which is in line with P4. Even more, during migration new roles and responsibilities are introduced as well, in order to be able to work with *DevOps*. Also, development, maintenance, and design tasks make place for integration and procurement tasks.

Some important additional findings related to the organizational structure were made besides the findings discussed above. As was mentioned in the previous paragraphs, due to the outsourcing of the infrastructure when migrating to SaaS, the tasks for the infrastructure manager are also outsourced. However, it is important to keep infrastructure managers in the IT-department. Although some part of the infrastructure is outsourced, in large organizations there is always an IT-infrastructure that needs to be maintained. Further, because DevOps and the use of SaaS has a large impact on the roles, responsibilities, and way of working of the IT-department, it is important to clearly communicate to the IT-employees what is going to change and give them time to get used to these changes.

5.4 Management Systems

In all cases, it came forward that the use of Agile and DevOps can contribute to the performance of the IT-department during and after SaaS-migration, because this allows to quickly adapt to changes and improves communication, collaboration, and integration. Moreover, by using DevOps, the SaaS-application can be gradually deployed in an iterative way and therefore allows for a smooth transition. Although the organization in the third case did not use DevOps, it was mentioned that the IT-department did shift towards an Agile way of working. So, besides working with DevOps, no other findings were made related to the use of new management systems. So, in contradiction with P5, the conclusion can be drawn that the management systems of the IT-department do not necessarily require re-design of management systems due to new goals and objectives. Still, it is advised to use DevOps, for a smooth transition to a SaaS-environment.

5.5 Skills

All interviewees argued that technical skills for maintaining and design of applications are not required in the IT-department after the SaaS-migration. Tasks related to technical maintenance and design of applications are outsourced to the SaaS-provider, which means that skills to perform these tasks are not required in the IT-department. So, the IT-department in a SaaS-environment requires less technical skills than before the migration. However, this does not mean that no technically skilled employees in the IT-department are required. It was argued that it is important to have enough technically skilled employees in the IT-department, because integration skills were significantly important during the migration. As mentioned before, the SaaS-application should be integrated such that it cooperates with the rest of the IT-landscape.

Besides the fact that technical skills become less important, it came forward in the case study that IT-employees require several new skills to optimally perform in a SaaS-environment. In this paragraph, the most important skills will be discussed that are necessary when migrating to SaaS. First of all, although very straightforward, IT-employees should be able to work with the new application. If they are not able to work with the application, this could seriously hinder the performance of the IT-department. Second, coordination and communication skills become increasingly important in the IT-department. IT-employees will have to collaborate with the (possibly multiple) SaaS-providers and serve as a bridge between the provider and the IT-department. Therefore, it is crucial that these employees can clearly communicate and coordinate the collaboration with the provider in a correct way. Also, procurement skills are

required to ensure that the IT-department gets the best deal for the SaaS-application. Additionally, skills related to delivery management become increasingly important, because SLA's have to be met. So, the case study pointed out that the skills required in the IT-department when migrating to SaaS shift from technical skills related to design, development, and maintenance of applications towards procurement and monitoring skills. Although technical skills will remain necessary, communication-, coordination and delivery management skills become increasingly important. Hence, it can be concluded that IT-employees require a new set of 'soft skills' during and after migration to a SaaS-environment, which is in line with P6.

Besides the 'soft skills' mentioned in the previous paragraphs, other skills were also identified as essential. First of all, IT-employees should be able to work with DevOps, because using this approach can increase the efficiency of migrating to SaaS and working in a SaaS-environment. Moreover, it was argued that data analytical skills becoming more important in a SaaS-environment. IT-employees should be able to work with the data that is involved with using the SaaS-applications. Furthermore, business analytical skills play a large role in the IT-department, because IT-employees should know how to work with the business processes that the new SaaS-application covers.

5.6 Knowledge

The main finding related to knowledge that came forward in the case study, was that IT-employees require a broad knowledge of the implemented SaaS-application, as the line between the infrastructure layer and the application layer fades in a SaaS-environment. It was emphasized that IT-employees should have enough knowledge of the functioning of the application, how the application is built up and how the integration of the application impacts the rest of the IT-landscape. By having a broader knowledge of the application, IT-employees understand what the provider offers, which allows them to choose the best SaaS-solution. Moreover, it was argued that the IT-employees should have a better understanding of how data can be used in a SaaS-environment, for improving the performance of the IT-operation. Hence, when comparing the findings of the case study with proposition P7, it can be concluded that the empirical findings prove the proposition right. IT-employees do require new knowledge after migration to a SaaS-environment, especially knowledge related to the functioning, build and integration of the implemented application.

5.7 Training

In two of the three cases, awareness training was given to teach IT-employees what the new application exactly entails and what the benefits are of the migration. This can help IT-employees understand why the organization decided to migrate to the new system and what the benefits are. In the second case, the IT-employees did initially not understand how the new system worked, which consequently had a negative effect on the performance of the IT-department. Therefore, training was provided to teach IT-employees how to work with the new SaaS-application. Furthermore, specific IT-employees were appointed and trained as key-user, to provide support related to the functionality of the application. These key-users have a deeper understanding of the application than other employees and are able to support others in case of issues related to the

new application. Moreover, it was recommended in two cases to provide communication training and teach IT-employees how to manage the collaboration with the SaaS-provider in terms of contract management and vendor management. Finally, if DevOps is used in the IT-department, training should be provided to teach IT-employees how to work with DevOps. Based on the findings of the case study, it can be concluded that IT-employees require training when migrating to a SaaS-environment (P8). The most important trainings that should be provided are related to awareness, working with the application, working with DevOps, training key-users and communicating with the vendor.

Besides training, other useful forms of education came forward in the case study as well. When migrating to SaaS-application, usually the vendor provides a knowledge base containing documents about the application that can be accessed by users in case of issues. It is the responsibility of the organization to make this knowledge base easily accessible and structured, so that IT-employees will not get lost in the amount of available information.

5.8 Culture

All the interviewees in the case study shared the same view regarding the influence of the use of SaaS on the culture within the IT-department: "Culture does not change on short term". In none of the cases a change in organizational culture was noticed when migrating to a SaaS-environment. However, the interviewees did notice that the motivation of the IT-employees could decrease due to the migration to SaaS. In the first and the second case, during the migration and after the migration the IT-employees lost some of the satisfaction in doing their jobs. A large part of the tasks of the IT-employees required technical abilities and was related to technical maintenance, design, and development of applications. Due to the outsourcing of these tasks, the motivation of the IT-employees decreased. Additionally, the migration to SaaS changed their regular way of working, due to the transition to DevOps and working with a completely new system. So, to keep the IT-employees motivated when migrating to a SaaS-environment, the changes that will occur in their way of working should be clearly communicated. Moreover, it is important to ensure the IT-employees that they have a certain future in the new setting of the IT-department and that they are still needed. Another way of keeping the motivation high is to give the IT-employees an incentive to work with the new application, by offering a financial bonus to those employees that have proven to work successfully with the new application. On the other hand, working in a SaaS-environment asks for a different mindset of the IT-employees. To stay motivated when migrating to SaaS, IT-employees should have an open-minded and proactive mindset. Especially when working with DevOps, because of its dynamic nature. In contrast to the first two cases, the interviewees in the third case did not experience lower motivation among the IT-employees. Instead, the IT-employees were eager to learn and work with the new system. According to the interviewees, this happened because the changes and expectations were clearly communicated upfront, which strengthens the point that changes regarding the way of working should be clearly communicated to the IT-employees. However, in this case the IT-employees did not immediately know what their role was and how they could be of added value in this new environment. Therefore, it is essential to give IT-employees enough time to discover their new roles.

From the case study, it came forward that to cope with motivation issues due to migration to SaaS, a different mindset of the IT-employees required. So, a different organizational culture is not the solution, as was suggested in proposition P9. Moreover, to keep IT-employees motivated in SaaS-environment, it is important to clearly communicate changes and expectations, ensure them of a certain future and provide them with incentives to work with the application.

5.9 Contractual Governance

In all the cases, it came forward that some form of contractual governance was used in the IT-department when migrating to a SaaS-environment. Because the transaction between the provider and the IT-department should be safeguarded, contracts in the form of SLA's were used. In the second case, it was argued that contractual governance was required even before drawing up the SLA. It is important for the IT-department to understand what the SaaS-provider can deliver and decide whether this service is in line with what is expected of the SaaS-application. Moreover, contractual governance became increasingly important, because performance agreements regarding applications used to be made internally with the infrastructure and network managers. Now, in a SaaS-environment, the performance agreements are made with the provider. Besides, when working with DevOps, drawing up contracts is difficult due to the dynamic nature of DevOps processes. Therefore, it was emphasized in all cases to have these performance agreements and expectations of the application clearly defined in an SLA with the SaaS-provider, to avoid miscommunication and avoid problems related to the expected level of service. To guide the contracting process in the good direction, an IT-procurement specialist or, depending on the size of the application, an IT-procurement team should be appointed. These IT-procurement specialists should draw up the SLA's and make strict and clear agreements with the SaaS-provider. Moreover, it came forward that Non-Disclosure Agreements (NDA) should be included in the SLA. In these NDA's, strict agreements regarding the confidentiality of the exchange of information between user and provider are made. This can enhance trust between the SaaS-provider and the user. Moreover, it was argued in two of the three cases that a meeting with the IT-department, IT-procurement team and the vendor should be organized on a regular basis, to discuss the performance of the SaaS-application and re-value the contract.

Hence, it can be concluded that contractual governance is required to safeguard good collaboration with the SaaS-provider (P10). It is important to know upfront what a provider can deliver and what the IT-department expects from the application. Moreover, IT-procurement specialists should be appointed to draw up the contract and make clear and strict agreements with the vendor. Afterwards, meetings should be held with the vendor on a regular basis to re-value the contract.

5.10 Relational Governance

From the first case, it came forward that relational governance is especially important when making use of large SaaS-applications, that have a big impact on the IT-operation and the rest of the business. Since in this case the SaaS-migration concerned small applications, no significant form of relational governance was applied. This view on the importance of relational governance is in line with results of the other two cases, that implemented large SaaS-applications that covered many business processes. In both these cases, it was argued that

relational governance played a big role in the IT-department to safeguard the relationship with the vendor. Maintaining the relationship with the vendor was done by means of (informal) meetings on a regular basis to discuss the performance of the SaaS-application. A vendor manager should be appointed that stays in close contact with the vendor to know when functionalities of the application will change, and communicate these changes to the rest of the IT-department. Further, in all the cases it was argued, to maintain a good relationship with the vendor, communication is key. Miscommunication can hamper the collaboration between the parties and therefore clear agreements regarding the collaboration should be made upfront.

The conclusion can be drawn that relational governance is an important capability for maintaining a good relationship with the Cloud-vendor when migrating to a SaaS-environment, which is in line with P11. Especially, when migrating to a large application that covers many business processes, relational governance is essential in the IT-department. A vendor manager should be appointed and meetings with the vendor should be organized to discuss performance. Overall, good communication is the most important aspect when it comes to maintaining the relationship with the Cloud-vendor.

6. Conclusions and Future Recommendations

In this paper, the changes that occur within the IT-department when migrating to SaaS were assessed. Moreover, it was indicated how the IT-department should adapt to perform in a SaaS-environment. A Case Study Research at three large organizations was performed to assess how resources and capabilities of the IT-department change and should be exploited, which can support decision-makers in a SaaS-environment. The following important resources and capabilities were identified: *financial assets, technological tools, organizational structure, management systems, skills, knowledge, organizational culture, contractual governance, and relational governance*.

Based on the empirical results, some conclusions can be drawn. SaaS does not necessarily lead to cost reduction of the IT-operation, this is highly dependent on the type of application and the underlying reason for migrating to SaaS. On the other hand, the costs of the IT-department will increase during migration due to double licensing costs and the need for additional resources. Further, it came forward that, on short term, the use of SaaS does not lead to shrinkage of the IT-department, even though many tasks are outsourced. Although the size of the IT-department does not decrease, there is a need for highly skilled IT-employees that are able to perform integration and procurement tasks. In general, it can be concluded that the use of SaaS causes a shift from 'technical' tasks to 'functional' tasks within the IT-department. Moreover, the use of DevOps processes is recommended in the IT-department to improve communication, collaboration, and integration when migrating to SaaS. One of the most significant changes within the IT-department is related to skills and knowledge. Due to the outsourcing of technical tasks, technical skills become less necessary. On the other hand, soft skills such as coordination skills, communication skills, procurement skills and delivery management skills become increasingly important in the IT-department. Also, IT-employees require a broader knowledge of the SaaS-application, compared to 'on premise'

applications. To acquire these new skills and knowledge, training is required in a SaaS-environment. It is essential to give awareness training, key-user training, communication training and training related to working with the new application and DevOps. Further, it is important to have IT-employees with a proactive and open-minded mindset, that are open to change. To keep IT-employees motivated and stimulated when migrating to SaaS, it is crucial to clearly communicate the changes within IT-department, ensure employees of their future in the department and reward them with a financial bonus if they successfully work with the new application. Contractual and relational governance become important capabilities when migrating to SaaS; strict SLAs should be made, meetings with the vendor should be held on regular basis and communication should be clear, for a successful collaboration with the SaaS-provider.

The observations and recommendations made in this paper, can be of use for IT-managers or other decision makers that are responsible for the performance of the IT-department, when migrating to a SaaS-environment. However, it should be mentioned that the results of this paper do have some limitations. Based on the limitations of this study, recommendations can be made for directions for future research:

- For the sake of the generalizability, the studied cases migrated to applications that differ in function and size. Some resources were significantly less impacted by the migration when the concerned application was relatively small and covered a small number of business processes, compared to applications that covered many business applications. In future research the differentiation can be made between the types and size of SaaS-applications, and study the impact of these separate applications on the organization of the IT-department. Moreover, it would be interesting to study the effect of IaaS and PaaS on the organization of the IT-department, and compare the results with the findings of this study.
- In this study, the use of DevOps processes was highly recommended for migration to SaaS, integration of SaaS-applications in the current IT-landscape and operation of the IT-department in a SaaS-environment. However, in this research it does not come forward how to apply DevOps processes in the IT-department when migrating to SaaS. Therefore, further research is necessary to make recommendations on the use of DevOps when migrating to SaaS.
- During the case study it came forward that IT-departments do not shrink in size on short term when migrating to SaaS. Also, it was mentioned that the culture of the IT-department does not change on short term. So, it would be interesting to find out how the use of SaaS impacts the size, culture and other aspects of the IT-department on long term.
- The case study showed that the costs of the IT-operation do not necessarily decrease when migrating to a SaaS-environment. Reduction of costs is dependent on the type of application and the reason for migrating. Further research is needed to discover under which circumstances the use of SaaS does lead to cost reduction of the IT-operation.
- Finally, in this research the importance of the resources of the IT-department were qualitatively assessed. It could be

helpful to repeat this study in a more quantitative approach to assess the relative importance of resources. This could especially be beneficial for improving skills and knowledge, since a significant amount of different new skills and knowledge are required in a SaaS-environment. Quantitative research could assess the relative importance of these skills and knowledge and prioritize the need for training. Moreover, a quantitative approach could give insight into the relation between the use of resources and can contribute to improving the organization of the IT-department when migrating to SaaS

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