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SOFTWARE-AS-A-SERVICE (SAAS) INNOVATION IN THE CONTEXT OF SOFTWARE INDUSTRY: A RESOURCE ORCHESTRATION PERSPECTIVE

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SOFTWARE-AS-A-SERVICE (SAAS) INNOVATION IN THE CONTEXT OF SOFTWARE INDUSTRY: A RESOURCE ORCHESTRATION PERSPECTIVE

Research in Progress

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Abstract

Cloud computing brings a paradigm shift in the software industry and changes the business model of software vendors (SV). Software as a service (SaaS), the most popular form of cloud computing, has been recognized as the fundamental change in the delivery, utilization, and management of software. While the transformation to SaaS requires changes within the organization, SVs must actively take action to attract customers to accept the SaaS business model, the so-called pull strategy. Drawing on the resource orchestration view, we propose that the antecedents (i.e., structuring cloud resources, developing service bundling capability, and leveraging cloud ecosystem) are related to the likelihood of an innovative SaaS, which, in turn, is associated with SaaS attractiveness to users. Our proposed research framework provides a guideline for SV to attract and persuade customers to adopt SaaS solutions actively.

Keywords: Pull Strategy, Resource Orchestration, SaaS, Software Industry.

1 Introduction

Cloud computing brings a paradigm shift in the software industry and changes the business model of software vendors (SV). Facing a paradigm shift in cloud computing, SVs incrementally implement software-as-a-service (SaaS) solutions to replace on-premises solutions. Over the past decade, SVs have undergone a transformation to SaaS and experienced significant growth. For example, Adobe Inc. announced a subscription-based offering, Adobe Creative Cloud, in 2012 and increased its market capitalization in sixfold in six years (Novet, 2018). Microsoft is another software company which successfully transforms into a cloud service provider. Microsoft's market value exceeded $1 trillion in April 2019, making it the world's most valuable company (Levy, 2019). According to the Gartner's forecast, the global SaaS growth rate will be 16%, and the global IT spending growth rate will be 5.1%. SaaS has become the main revenue growth driver for SVs, with SaaS market value jumping to $176.6 billion in 2022 (Gartner, 2021). In addition, Cloud Industry Forum conducted a survey and found that 55% of firms have increased their cloud adoption due to COVID-19 pandemic. This rising trend has certainly accelerated SVs move to the cloud (Patrizio, 2021).

The benefits for SVs migrating to cloud services are multi-folded (Hedman & Xiao, 2016). SVs can carry out long-term research and development (R&D) investment and planning, leading to a more stable cash flow. The multi-tenant architecture for customers also reduces the maintenance cost. Besides, SVs can understand user needs by grasping the context of use through data analysis. Moreover, the rapid iterative development allows SVs to quickly respond to a market demand. At the same time, the subscription model lowers the purchasing threshold, making SVs easier to attract new customers. Despite SVs enjoy many benefits from SaaS transformation, the transition is not easy, or even a stormy

one. According to a PwC report (2017), among the top 50 software companies, only 11 gained more than 10% of their total revenue from SaaS.

Despite the promising benefits of cloud computing, enterprise customers have raised relevant concerns, including information security, vendor lock-in, performance unpredictability, and complexity in adopting cloud computing, among others (Kung et al., 2015). SVs must overcome many internal barriers of SaaS transformation, such as applying new development and operations (DevOps) flow, supporting higher standard service level agreement, monitoring new operational indicators like retention rate and churn rate, resolving higher security risks, implementing new incentive programs for sales teams, and so on. Furthermore, there are many external obstacles, including changing customers' pricing model preference, explaining lower customization flexibility to customers, reducing concern for data lock-in risks, minimizing data breach threats, and mitigating conflicts of interest among system integration partners.

The prior literature on SaaS focuses on discussing SaaS transformation within the firm boundary. These studies adopted a "*push*" thinking with a presumption that as long as SV makes superior internal changes, customers will undoubtedly accept its offerings (Kranz et al., 2016; Xiao & Hedman, 2019; Schneckenberg et al., 2021). However, from the observation of practical phenomena, even if a SV itself does a good job in SaaS transformation, customers and resellers not necessarily appreciate the transformation. In fact, SVs need to actively attract customers to accept the SaaS business model, the so-called "*pull*" strategy, which has been less discussed in the extant literature.

Because SaaS transformation involves the processes of continuously managing SV's resources and capabilities to pull stakeholders together to migrate to the cloud, we draw on resource orchestration view (ROV) as the theoretical lens to examine the SV's pull strategy in SaaS transformation. Specifically, we aim to investigate how SV managers orchestrate the internal and external assets, resources, and capabilities to actively attract customers and partners in adoption of the SaaS business model.

The theoretical foundation is further elaborated in Section 2. We propose a research framework in Section 3 and describe the research methodology in Section 4. The paper ends with the expected contribution and future research in Section 5.

2 Theoretical Background

2.1 SaaS Adoption

Prior literature on SaaS adoption has examined the pros and cons of SaaS adoption from a user's perspective. The adoption of SaaS is beneficial in terms of cost reduction and improved cash flow. In addition, SaaS provides its users with flexibility to switch among providers and with higher service quality. Furthermore, SaaS allows users to focus on their core competencies by outsourcing application development and management. In addition to the pros, SaaS has its own cons. For instance, users may end up paying more for application provision, and outsourcing may result in the loss of business-critical resources or knowledge. Although SaaS providers strive to deliver high-quality service, there is still a risk of Service Level Agreements violation, particularly regarding availability, performance, and application interoperability. Such occurrences can potentially affect mission-critical processes and data security (Benlian et al., 2010).

Previous literature has studied the antecedents of SaaS adoption. Hsu et al. (2014) applied the technology-organization-environment (TOE) framework from innovation diffusion theory to construct a model for cloud service adoption. Their findings suggest that perceived benefits, business concerns, and IT capability are significant factors that influence cloud adoption, while external pressure does not play a significant role. In another empirical study, Alkhater et al. (2018) investigate the factors influencing cloud adoption in private sector organizations, the quality of service and trust were identified as the most influential determinants of cloud adoption. However, this study also found that security and privacy concerns continue to hinder cloud adoption.

Although the existing studies have identified the important antecedents of SaaS adoption from the perspective of customers rather than that of SVs. Typically, customer-centric studies are related to

internal and external barriers of SaaS adoption. However, we are more interested in exploring SV's efforts on SaaS adoption. Specifically, we adopt the perspective of SV to facilitate our understanding of SV strategies to attract and persuade SaaS adoption among their customers.

2.2 SV Pull Strategy

Push/pull strategies are frequently utilized to direct promotional efforts towards consumers. Keller (2000) differentiated between "pull" strategies, which aim to create consumer demand, and "push" strategies, which facilitate product distribution through distributors. Push strategies prioritize the organization's resources, competencies, and capacity, while pull strategies focus on the needs of the market. In our research, we focus on SV's pull strategy. Specifically, we examine how SVs proactively attract customers to adopt SaaS.

Benlian and Hess (2011) suggest that IT executives' perception of SaaS opportunities is primarily driven by cost advantages. Nevertheless, their overall risk perceptions are largely influenced by security threats. Therefore, SVs can use SaaS innovation strategy to promote customers' awareness of SaaS cost advantages, which can pull customers to adopt SaaS. For example, Adobe Creative Cloud not only provides software functions but also includes contents such as one million+ free photos, drawings, video clips, and 20,000+ fonts for subscribed users to use design materials. During the COVID-19 period, Microsoft renamed its Office 365 to Microsoft 365, seamlessly integrated Microsoft Teams, and enhanced team collaboration and productivity during the pandemic. In addition, Zoom Meetings enhances customer value through the Partner Program on the Zoom platform, where Integrated Software Vendors (ISV) integrate into Zoom by creating applications for the App Marketplace or embedding Zoom into their application and offering it as a value add.

Persuading clients to migrate to SaaS is not just a technical issue. For SVs, merely having cloud services ready does not guarantee customer compliance with the change. Therefore, this study focuses on how SV managers can effectively implement Pull strategies by examining internal and external resources and capabilities of the firm and by restructuring and bundling innovative SaaS services that are attractive to customers.

2.3 Resource Orchestration View for SaaS

Prior studies have adopted two theoretical views to examine SaaS in organizations. The first view is the resource-based view (RBV), focusing on what resources and capabilities organizations should have to facilitate the SaaS model. For example, Kranz et al. (2016) showed the important role of the absorptive capacity and organizational ambidexterity in SaaS adoption. Schneckenberg et al. (2021) identified a portfolio of IT and organizational capabilities that SVs can leverage their cloud computing-enabled innovations, including customer-centric offerings, customer relationships, technological capabilities, business flexibility, dynamic ecosystem architectures, cash flow management, and adaptive revenue flow.

In addition to RBV, the dynamic capabilities view (DC), which emphasizes various capabilities of sensing, integration, and reconstruction in response to the changing environment, is also frequently used in the research of digital innovations. Taking the recent research as examples; Helfat and Raubitschek (2018) have found that innovation, environmental scanning and sensing, and integrative capabilities have a positive impact, and advocated that integration capabilities are the important key of digital platform leaders to capture value. Magistretti et al. (2021) have proposed dynamic capabilities based on design thinking can help organizations discover new opportunities brought about by digital technology at an early stage, thereby inspiring organizations to promote digital transformation.

Although RBV and DC have been used to study which organizational and dynamic capabilities SV should possess to grasp new business opportunities in the cloud age, they paid less attention in the process of how to acquire, accumulate, and divest resources and create new customer value by bundling, integrating, and leveraging multiple resources and capabilities (Sirmon et al., 2011). Furthermore, most of the past research focuses on the adjustment of SV itself, and there is less discussion on actively attracting customers and partners to participate in SaaS transformation. To gain an in-depth

understanding of how to actively attract customers and partners to accept the SaaS business model through the Pull approach, we tend to examine how SV manages key resources and what dynamic capabilities are required to pull their customers to SaaS. Accordingly, we posit that the ROV offers an appropriate theoretical lens to investigate the SV's actions of enhancing clients' engagement in SaaS adoption.

Resource Orchestration View (ROV) combines the two frameworks of Resource Management based on RBV and Asset Orchestration based on DC to emphasize managers' orchestrated actions to structuring, bundling, and leveraging a company's key resources and co-specialized assets in response to rapidly changes in external environment and dynamically to create new competitive advantages and improve company performance (Sirmon et al., 2011). Different from RBV, which focuses on the characteristics of resources, ROV emphasizes the actions of managers. For example, managers may be interested in several action-related questions, including which resources should be acquired or given up and how to leverage the resources at hand to create new value. Compared with DC, ROV focuses on process-oriented managerial actions. In an uncertain environment, managers need to initiate various management actions to orchestrate resources and synchronize actions at all stages to create new competitive advantages, and this is a dynamic adjustment process. We believe that ROV is suitable for this research for the following reasons.

First, SaaS are characterized by their multitenancy/on-demand usage, usage-based pricing models, and development and maintenance in underlying layers such as Platform as a Service (PaaS) or Infrastructure as a Service (IaaS), which requires a fundamental re-evaluation and restructure of managerial and company resources (Kaltenecker & Hess, 2014). Taking the customer's information security concerns for the cloud service as an example, SV needs to establish an information security team and technical capabilities, obtain relevant international certifications, continuously respond to hacker attacks, and cooperate with complementarities in the cybersecurity ecosystem to build customer trust. ROV, which emphasizes the process of resource management and dynamic adjustment, is thus considered to be suitable.

Second, ROV allows us to further investigate the Pull approach throughout the customer life cycle, which is broken down into three distinct stages – acquisition, engagement, and retention. In the acquisition stage, SV analyzes customer data from cloud services and makes development decisions to respond to market demands and attract customers to adopt cloud services. In the engagement stage, SV provides more added value to customers through service bundling, such as launching a combination suite of multiple services, or providing digital content and cross-service integration that customers need to complete their work. The decision of which services to bundle involves using data analysis and customer success teams to collect customer feedbacks. If the customer's demand comes from the digital content or function of the third-party vendors, they need to be integrated with other complementors (Schneckenberg et al., 2021). In the retention stage, it is necessary to continuously observe usage data and customer feedback to attract subscriptions and renewals. SV can create greater value and reach more potential customers with the power of the group by joining or forming an ecosystem. SV can also adjust its organization and reward system, such as setting up a customer success team to actively assist customers in migrating and using SaaS; SV also needs to propose new incentive programs for sales teams and channel partners, so that all stakeholders are willing to move forward to SaaS together (Xiao & Hedman, 2019).

3 Research Framework

In recent years, research on ROV has focused on the empirical relationship among resources, capabilities, orchestration actions, and firm performance (Liu et al., 2016; Yu et al., 2021; D'Oria et al, 2021). According to the literature, we identify three resource orchestration actions – structuring cloud resources, developing service bundling capability, and leveraging cloud ecosystem. These three actions highlight the SV pull strategy throughout the customer lifecycle. The research framework is shown in Figure 1.

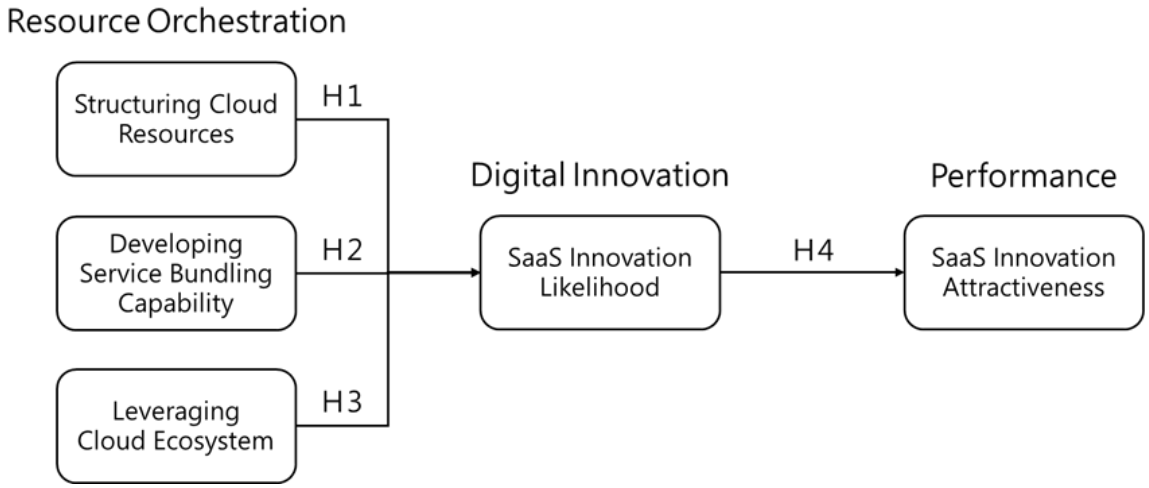

Figure 1. Conceptual Research Framework.

3.1 Structuring Cloud Resources

In the cloud computing market, multiple providers offer cloud-related services, and customers' decisions on service consumption depend on factors such as price, quality of service (QoS) guarantees, and satisfaction of advertised guarantees (Pal and Hui, 2013). Therefore, for SVs, increasing customer value, reducing operational costs, and improving service availability through innovation are key activities to attract customers to adopt SaaS. We argue that a firm is likely to provide an innovative SaaS when the firm is able to structure cloud resources within the firm.

Prior studies have suggested that firms prepare themselves with relevant resources in order to make competitive moves/strategies (Li et al. 2010, Xiao & Hedman 2019). Xiao & Hedman (2019) suggested that SVs who focused on on-premises applications still have to adjust their internal and external resources to provide SaaS applications. In addition to data center, SVs need to be able to establish several types of internal teams for their SaaS applications, including cloud research and development teams, cloud operation teams, and cloud sales/marketing/success teams. For example, typically, users concern about cloud security when they are using SaaS applications. To reduce such a concern, SVs need to allocate resources (e.g., staff and budget) in cloud research and development teams to strengthen cloud security. Furthermore, users highly expect that SaaS applications are compatible with other SaaS applications. To fulfill such an expectation, SVs need to be able to cooperate with third-party partners to ensure application compatibility. Therefore, a firm which is able to structure relevant internal and external resources is likely to provide an innovative SaaS. We hypothesize:

H1: The capability of structuring cloud resources is positively related to the likelihood of an innovative SaaS.

3.2 Developing Service Bundling Capability

Bhattacherjee and Park (2014) proposed and empirically validated a model that explains why customers choose to migrate to the cloud. Two pull factors, relative usefulness and universal access, attract customers to the cloud. Customers are more likely to migrate to the cloud if they perceive cloud computing as more advantageous than traditional client-based computing. Additionally, the expected omnipresence of cloud computing, which enables anywhere/anytime access, increases their intention to migrate to the cloud.

To enhance relative usefulness and universal access, we postulate that a firm is likely to provide an innovative SaaS when the firm can develop service bundling capability. Prior literature has found that firms could gain more benefits from their bundling services when the correlation of consumer preferences over the services in the bundle is positive (Gandal et al., 2018). However, it is challenging to identify appropriate service bundles because users are uncertain about their valuation of services

(Henfridsson et al., 2018). Therefore, the capability to design various bundles and combine with different services is critical for firms (Xin, 2018). In our research context, when using SaaS applications, users generate a large amount of usage data, which is beneficial to understand how users interact with different applications. Usage data provides critical insights for SVs to develop their capability of analyzing and selecting the bundling of applications (Schneckenberg et al., 2021). Therefore, the SVs are more likely to provide an innovative SaaS. We hypothesize:

H2: Developing service bundling capability is positively related to the likelihood of an innovative SaaS.

3.3 Leveraging Cloud Ecosystem

Schneckenberg et al., (2021) present a digital innovation model that explores how SVs utilize cloud computing for value creation. The study finds that SVs leverage the complementarity between IT capabilities, business flexibility, and dynamic ecosystem architecture to attract and retain SaaS customers. By actively participating and even leading cloud ecosystems, SVs gain advantages from stronger relationships with customers, partners, affiliates, and integrators. The openness of SaaS solutions is crucial for SVs' success. By opening up their systems, SaaS providers enable customers and partners to adapt certain aspects, which can lead to increased adoption and innovation. Partnering with established cloud providers can help build trust and create collaboration platforms that generate lock-in effects for customers and partners. In addition, network effects are considered a significant factor in extending customer segments and fostering customer loyalty.

We hypothesize that a firm is likely to provide an innovative SaaS when the firm is able to leverage its cloud ecosystem. SVs can expand the value of their SaaS with the help of partners in a cloud ecosystem. Within an ecosystem, SVs can integrate their SaaS applications with various other SVs' applications through application programming interface (API), leading to increase SVs' competitive advantages. For example, Findikoglu et al. (2021) have indicated that small SVs either supplement or complement their IT resources and capabilities via partnerships. In addition, prior studies have found that SVs joining a platform ecosystem is associated with an increase in sales and a greater likelihood of issuing an initial public offering (IPO) (Ceccagnoli et al., 2012). This finding implies that SVs are more likely to provide an innovative SaaS when they are able to leverage a cloud ecosystem. Therefore, we hypothesize:

H3: The capability of leveraging cloud ecosystem is positively related to the likelihood of an innovative SaaS.

3.4 SaaS Innovation Likelihood

ROV suggests that resource orchestration actions can be analyzed in terms of breadth (scope of the firm) and depth (throughout different levels within the firm). The breadth strategy emphasizes the importance of synergies among multiple resources to create value, while the depth strategy highlights the interrelationships between orchestrators and other participants (Sirmon et al., 2011). In the breadth strategy, firms provide a resource portfolio that differentiates them from competitors to create business value. In this research context, SV can launch a SaaS innovation by bundling a breadth of existing services to create value. For example, Adobe and Microsoft continuously combine various suites in their service design to increase service value for existing users and attract new users.

In the depth strategy, resources are vertically orchestrated from top to bottom, including different management levels. In this study, we extent it to outside the enterprise, including partner networks and ecosystems. SV can employ the depth strategy to launch a SaaS innovation that integrates partners' SaaS services and leverages network effects to encourage more users to adopt SaaS services while also increasing customer loyalty. Taking Zoom Meetings and Slack Technologies as examples, they actively manage partner programs by offering open APIs to attract value-added developers to develop on their platforms, enhancing the overall ecosystem value for customers. They also strive to make their services appear in other third-party SaaS services to attract more new users and retain them by creating a network effect.

Therefore, in line with ROV, we argue that a SaaS is more attractive to customers when a SV is more likely to provide an innovative SaaS through effectively orchestrating resources in breadth and depth.

These SaaS innovations should help customers to fulfill their unmet needs and gain their competitive advantages, which in turn increases the attractiveness of SaaS. Therefore, we hypothesize:

H4: The likelihood of an innovative SaaS is positively related to SaaS attractiveness.

4 Research Methodology

To examine our hypotheses, we will conduct a survey study. We will focus on small and medium-sized SVs in Taiwan. We will collect survey data from Taiwan Cloud Market Place (TCloud)[1]. TCloud is the largest platform in Taiwan which involves more than 300 SVs and 32,000 small and medium-sized enterprises. We expect to collect more than 100 valid survey responses. Table 1 shows our constructs, construct definitions, and the sources of measurement items.

Due to the exploratory nature of our study, we will employ partial least squares structural equation modeling (PLS-SEM) to analyze the data. We also will utilize PLS analysis to evaluate the research model. The advantage of PLS is that it can assess the reliability and validity of the measurement model while testing the structural model concurrently.

Table 1. Construct Definition.

Construct	Construct Definition	Sources of Items
Structuring Cloud Resources	This construct is defined as the extent to which the SV is able to manage cloud resource portfolio by acquiring, accumulating, divesting internal and external resources. The survey items of this construct will be used to measure management actions for scanning internal resources and searching for external resources, capability for acquiring external resources after identifying necessary ones, and management cycles for restructuring internal and external resources.	The items will be adapted from Helfat et al. (2007), Sirmon et al. (2007) and Sirmon et al. (2011).
Developing Service Bundling Capability	This construct is defined as the extent to which the SV is able to combine cloud resources and bundle different services to construct innovative SaaS. The survey items of this construct will be used to measure the capability of using cloud data analytics to monitor unsatisfied or potential new needs, the capability of leveraging existing internal resources to meet customer demands, and the capability of integrating internal and external resources to launch new services.	The items will be adapted from Helfat et al. (2007), Sirmon et al. (2007) and Sirmon et al. (2011).
Leveraging Cloud Ecosystem	This construct is defined as the extent to which the SV is able to leverage its cloud ecosystem to create value for customers. The survey items of this construct will be used to measure the ability to find partners from the cloud ecosystem to meet customer needs, the ability to dynamically integrate with partners on technical and business aspects, and the ability to leverage partners to quickly launch innovative services and enhance customer value.	The items will be adapted from Mu et al. (2016) and Sirmon et al. (2011).
SaaS Innovation Likelihood	This construct refers to the likelihood of the SV to provide an innovative SaaS. The survey items of this construct will be used to measure the likelihood of SV to create customer value via bundling a breadth of existing SaaS services and integrating partners' SaaS services.	The items will be adapted from Kaya et al. (2020) and Schneckenberg et al. (2021).

[1] https://www.tcloud.gov.tw/

SaaS Innovation Attractiveness	This construct is defined as the extent to which the SV is able to acquire, engage, and retain customers. The construct will be operationalized by the number of transactions and the amount of sales generated by SV in TCloud's cloud marketplace during a specific period.	The data will be directly retrieved from TCloud's database.

5 Expected Contribution and Future Research

We expect two contributions of this research-in-progress. First, we will contribute to the literature on SaaS innovation by studying a novel research context. Prior literature has examined SaaS adoption from a user perspective. However, little is known how and why SVs conduct their SaaS transformation. Second, drawing on the framework of resource orchestration, we propose that the antecedents (i.e., structuring cloud resources, developing service bundling capability, and leveraging cloud ecosystem) are related to the likelihood of SaaS innovation, which is associated with SaaS attractiveness to users. We will further examine the proposed research model.

The expected practical contributions of this research-in-progress are as follows. SVs encounter the difficulty of transforming their business. This study proposes an integrated framework that helps SV's management team recognize how to transform its business to SaaS. Moreover, the framework of this study can be applied to firms in other industries which need to actively attract and persuade customers to accept SaaS transformation moves. By understanding the process of how to orchestrate resources and build new capabilities through the pull approach, SaaS transformation can be accelerated.

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