Business Model Characteristics for Local IaaS Providers for Counteracting the Dominance of the Hyperscalers

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Abstract. The Infrastructure as a Service (IaaS) market is dominated by only a few globally acting hyperscalers. The rest consists of a multitude of smaller providers whose IaaS services are restricted to one country or region. As basic IaaS services have become a commodity, the price has turned into the most important decision criterion for customers. For this reason, the central concern of IaaS providers is to achieve economies of scale. However, because of their marginal size, the locally operating IaaS providers are unable to compete in this situation. Accordingly, a growing market consolidation among the local IaaS providers can be expected within the next years. To compete with the further increase in dominance of the hyperscalers, this paper investigates business model characteristics applying to local IaaS providers. The hypotheses were derived from 21 expert interviews with representatives from 17 cloud providers. Due to the exploratory character of this study, the research approach followed the guidelines of the grounded theory method.

Keywords: Cloud Computing, Infrastructure as a Service (IaaS), Local IaaS Providers, Business Model, Cloud Computing Ecosystem, Success Factors, Grounded Theory.

1 Introduction

According to a current study of Gartner [1], the market for Infrastructure as a Service (IaaS) is dominated by five globally acting hyperscalers: Amazon Web Services, Microsoft, Alibaba, Google and Rackspace. Amazon Web Services as the leading IaaS provider controls about 44 percent of the sector [1]. Apart from the hyperscalers, a large number of locally operating, mostly small- and medium sized, providers offer IaaS services, too [2]. These providers exclusively offer their services within one country or region. As already foreseen by Böhm, Koleva, Leimeister, Riedl and Krcmar [3] in 2010, the basic IaaS service model has become a commodity in the meantime. Accordingly, there remain only a few opportunities for IaaS providers to differentiate from one another by their business models. Due to this high degree of homogeneity of the IaaS services among the various providers, the price has become the most important decision criterion for customers. The central issue of IaaS providers is consequently to obtain economies of scale. Only this way, IaaS services can be delivered at comparatively low costs. For local IaaS providers it is impossible to keep

pace with this intensive price competition. The hyperscalers are well aware of their position of power and have been continuously pushing down the prices aiming to kick their local competitors out of the market. As a consequence, a growing market consolidation among the local IaaS providers can be observed for a certain period of time. To give an example, United Internet recently acquired Profit Bricks, a medium-sized IaaS provider concentrating on the German market.

To prevent further company acquisitions and thus, cluster building among the local IaaS providers, it is mandatory for local IaaS providers to design and implement differing business models. To the best of the authors' knowledge, business model characteristics influencing the success of local IaaS providers have been, however, neglected in the literature so far. Beyond this background, this paper addresses the following research question: **What are business model characteristics for local IaaS providers to successfully differ from the hyperscalers in order to ensure their long-term competitiveness within the cloud computing ecosystem?**

The paper proposes eight hypotheses on differing business model characteristics for local IaaS providers. The hypotheses were derived from 21 expert interviews with representatives from 17 cloud providers. To maximize insights, experts who work for cloud providers characterized by different experience, size, geographic coverage, target markets and served industries were interviewed. Due to the exploratory character of this study, the research approach followed the fundamental guidelines of the grounded theory method [4].

2 Related Work

Cloud computing represents a new IT operations model that has radically changed the way IT resources are produced, provided and used [5]. The vision that IT services offered from the cloud are commoditized and delivered in a manner similar to traditional utilities such as water, gas and electricity [6] is increasingly becoming a reality. According to the often cited definition of the National Institute of Standards and Technology (NIST), "*[c]loud 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*" [7]. The five key characteristics of cloud computing services, including on-demand self-service, broad network access, resource pooling, rapid elasticity and measured service, distinguish it from on premise IT solutions [8]. In order to meet the requirements of various customers, four deployment models are available, namely public, private, hybrid and community clouds. These deployment models differ in their degree of operational isolation regarding access to a specific cloud service and the physical location of the servers [5, 7].

With the introduction of cloud computing, both vendors of traditional IT services and start-up companies were given the opportunity to take up new roles in this emerging market [9]. A role can be understood as a "*set of similar services offered by market players to similar customers*" [3]. This evolution was accompanied by a shift from

sequential customer-focused IT value chains to complex network-like business ecosystems [10]. A business ecosystem represents a pertinent scope for systemic innovations, where different interrelated and interdependent companies cooperate to deliver full-scale customer solutions [11]. In order to create a profound understanding of the business ecosystem in the context of cloud computing, several attempts of a formal description have been made [12]. A comprehensive role-based ecosystem model is the **Pa**ssau **C**loud Computing **E**cosystem Model (PaCE Model) [13]. Its core consists of providers of the three cloud computing service layers: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) [7]. Building on these three interrelated service layers, a multitude of further roles, such as aggregators, integrators and market place operators, has emerged [12]. This paper focuses on the infrastructure provider's role, which offers basic infrastructural resources (compute, storage and network) [13].

Each ecosystem role is related to specific business opportunities for providers. Hence, each role must be instantiated by a different business model [14]. A business model can thus be defined as a detailed specification of how ecosystem roles are realized by individual actors [15, 16]. Apart from the business ecosystem view, a business model is seen as a tool for describing, implementing and evaluating the business logic of a firm [17]. Even though no commonly accepted definition of the term "*business model*" has been established yet, the component-based view dominates the research. Accordingly, a business model is a system comprising a set of constitutive components or partial models and the relationships between them [18]. An agreement related to a specific set of relevant components is, however, missing [19]. Nonetheless, a multitude of cross-industry and industry-specific business model frameworks provide design options for selected components [20]. One comprehensive and widespread cross-industry framework is the Business Model Canvas [21], which includes nine components: key activities, key resources, partner network, value propositions, customer segments, channels, customer relationships, cost structure and revenue streams.

Overall, the research on cloud computing business models is nascent [8, 22]. The only comprehensive cloud computing-specific business model framework so far was proposed by Labes, Erek and Zarnekow [23]: it entails eight categories representing the basic components of a business model, further broken down into design features showing possible design options. Labes, Hanner and Zarnekow [24] compared the business models of selected IT service providers with the framework and identified four common patterns of cloud business models. Apart from that, researchers analyzed the fundamental impacts of the shift from delivering on premise IT applications to cloud services (e.g. [8, 10, 25-27]). In addition, scholars have dealt with the process of transforming an on premise to a cloud business model [28, 29]. Ebel, Bretschneider and Leimeister [30] developed and evaluated a software tool for supporting the business model creation. A literature study of Labes, Erek and Zarnekow [22] shows that several further contributions have dealt with one specific or a small number of business model components, such as the revenue [31] or the resource model [32], whereas a holistic approach remains an exception. Investigating them isolated, however, contradicts the logic of business models as the components are interrelated and interdependent [18, 20].

The business model concept became popular after the burst of the dot-com bubble in 2000 [18]. The reason was that scholars were searching for an explanation why a large number of firms had failed, while others had been successful [20]. Thus, the business model concept has played a central role in explaining a firm's performance and deriving success factors for a considerable time [16, 33]. Rockart [34] defines success factors as "*the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization*". Success factors are by definition applicable to all companies of a specific industry with similar objectives and strategies [35, 36]. In this paper, this is substituted by ecosystem roles having their own business model characteristics. A fundamental distinction can be made between generic success factors, which are valid for all kind of companies, and domain-specific success factors, in this case cloud-specific success factors [24]. Hence, it is difficult to transfer the success factors from adjacent research areas to the cloud computing ecosystem without prior examination [37]. Success factors of cloud providers' business models have been addressed by the following studies: Trenz, Huntgeburth and Veit [38] focused on specific success factors regarding the relationship between providers and consumers in the end consumer market. Labes, Hanner and Zarnekow [24] derived abstract success factors by relating publicly available characteristics of the business model components to a firm's web visibility and profit. However, both studies neglected that the cloud computing ecosystem allows the adoption of more than one role and thus, is characterized by a high degree of heterogeneity [13]. Whereas several studies have examined the SaaS provider's role [37], to the best of the authors' knowledge, the infrastructure provider's role and consequently also local IaaS providers are still missing and therefore addressed in this study.

A literature review by Poulis, Yamin and Poulis [39] shows that there is, independently of the cloud computing context, a large amount of literature available which compares multinationals with domestic companies along several dimensions. However, there is a dearth of research on how local firms can compete with the dominating and globally acting companies [39]. According to Chang and Xu [40], this phenomenon has been typically studied from the perspective of multinational firms. This means that local firms have been mostly seen as passive recipients and not as active competitors in a given market [40].

3 Research Design

Quantitative research methods predominantly allow the verification of already formulated hypotheses. As research on differing business model characteristics for local IaaS providers is nascent, it is necessary to further collect data in order to continue and deepen the investigations. Due to this exploratory and hypotheses generating character, the research approach follows the fundamental guidelines of the grounded theory method [4]. "*The grounded theory approach is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon*" [41]. According to Wiesche, Jurisch, Yetton and Krcmar [42], the grounded theory method is, however, not exclusively appropriate to develop

a theory. Also models (definitions of abstract variables and their relationships, formulated as hypotheses) or rich descriptions of new phenomena may be the outcome. The targeted contribution is strongly dependent upon the choice of grounded theory procedures [42]. In line with Wiesche, Jurisch, Yetton and Krcmar [42], a partial portfolio strategy was applied as the objective here is a model in the form of hypotheses.

To reach the goal of deriving hypotheses on differing business model characteristics for local IaaS providers, 21 exploratory expert interviews [43] with representatives from 17 cloud providers had been conducted. The 21 experts stemmed from twelve large and five medium-sized cloud providers, had between three and ten years' experience in the cloud field and held leading positions within their companies (board members, portfolio, product, sales, marketing and IT managers, and senior consultants). The cloud providers are characterized by different experience, size, geographic coverage, number of occupied ecosystem roles, target markets, served industries and assessment of the importance of cloud services compared to on premise solutions.

All interviews were based on a pre-tested interview guide, encompassing semi-structured and open-ended questions. The interview guide (available upon request from the authors) focused on deriving business model characteristics influencing the success of IaaS, PaaS and SaaS providers from different perspectives. These perspectives were taken from the literature on success factors and business models. When conducting the interviews in accordance with the grounded theory approach, the authors posed more detailed questions, depending on the flow of conversation, and thus, expanded the basic version of the interview guide. For this purpose, the laddering technique, which follows a process of digging deeper by asking further questions [44], was applied whenever considered appropriate. The interview guide was not sent to the experts in advance deliberately, as spontaneous responses were desired.

The 21 interview sessions took place from June to November 2017. The interview language was German. Ten interviews were done face-to-face, eleven via telephone. Sturges and Hanrahan [45] have shown that there are no significant differences between a face-to-face and a telephone interview with regard to the quality of the gathered data. The duration of the interviews ranged from 30 to 100 minutes. In order to facilitate the data analysis, all interviews were recorded with the permission of the participants. Each interview was transcribed and proof read. The aggregated transcripts comprised 182 pages of text. As the participants were guaranteed anonymity, the acquired data was sanitized so that no single person or company can be identified.

In line with the grounded theory method, the data analysis started parallel to the data collection and was guided by constant comparison. The data analysis was performed in two phases according to the recommendations of Corbin and Strauss [46] with the qualitative data analysis software MAXQDA. The first phase consisted of open coding – "*[t]he process of breaking down, examining, comparing, conceptualizing, and categorizing data*" [41]. The derived codes were discussed among the authors and colleagues of the research department in an iterative manner until common agreement was reached. In the second phase, the axial coding technique – relating codes to each other through a combination of inductive and deductive thinking [41] – was applied. This resulted in eight main codes, which represent the derived hypotheses on differing business model characteristics for local IaaS providers. Overall, the

whole data analysis was an iterative process of (re-)coding data, splitting and combining categories, and generating new or dropping existing categories. The research process was continued until theoretical saturation was reached [46]. This was the case, when the answers of the interviewees contained no longer new aspects, so that further data collection would not have provided additional insights.

The most of the eight hypotheses are related to aspects for which a market demand exists, which is, for various reasons, not covered by the hyperscalers. Explanations might be that the hyperscalers (i) ignore the opportunities as these stand against their goal of obtaining economies of scale (**H2**), (ii) obey them to a substantial lesser extent (**H1**, **H3**, **H4**, **H7**) or (iii) have deliberately chosen alternatives (**H8**). Furthermore, two hypotheses are based on partnership opportunities offered by the hyperscalers, which seem to be auspicious for local providers (**H5**, **H6**). Summarized, the business model characteristics for local IaaS providers differ from the current business models of the hyperscalers and can at least partially be explained by customer demands.

4 Local IaaS Providers and Relevant Business Model Characteristics

In order to get a better understanding of the special situation of local IaaS providers and thus, of the derived hypotheses, a representative example for the analyzed providers is presented briefly: Provider *Alpha* is a medium-sized company employing about 150 people in southern Germany. The company operates two main and two smaller data centers, located in two different cities. Customers are firms of all sizes, primary domiciled in the region, but also from the rest of Germany. The service portfolio consists mainly of traditional IT outsourcing and cloud services. Among the cloud services, all three service models (IaaS, PaaS and SaaS) are supported.

The eight hypotheses on specific business model characteristics for local IaaS providers are presented and explained in detail below. Figure 1 illustrates the match of these business model characteristics with the nine components of the Business Model Canvas [21]. As it can be seen, the hypotheses mainly focus on the value propositions, whereas other business model components, such as revenue streams or customer segments, were not mentioned as differing characteristics. **H5** and **H6** were assigned to both the partner network and the value propositions.

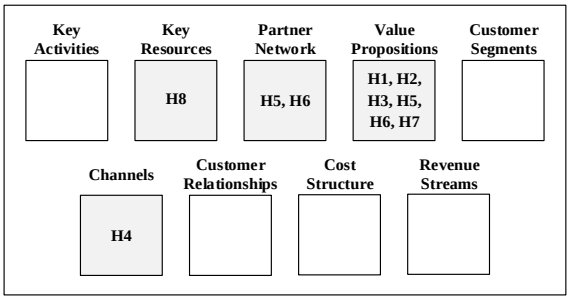

Fig. 1. Mapping the Hypotheses with Business Model Components

H1: Offering extensive transition services from on premise infrastructure to IaaS is positively related to local IaaS provider's ability to compete.
The interviewed experts stated that medium-sized and large companies have invested quite a lot into on premise infrastructure. Those companies face a considerable challenge when partially moving existing IT applications into the cloud. Only in rare cases, the migration of the systems can be managed without external help. During the transitional period, extensive consulting and customizing support is necessary to get a firm ready for the cloud. The interviewees stressed that the hyperscalers, however, offer such transition services only to a limited extent. Instead, their focus within the market is mostly on firms of all sizes that are already cloud-ready. This gap between clients' demand and the hyperscalers' service portfolio reveals a large opportunity for local IaaS providers. In addition, offering transition services brings further advantages for a provider as he can directly win clients based on his own IaaS service portfolio.

H2: Offering customer-specific adaption of IaaS services is positively related to local IaaS provider's ability to compete.
IaaS services from the hyperscalers are characterized by a very high level of standardization. This is the only way to achieve the targeted economies of scale. But, according to the interview partners, some customers have additional requirements that cannot be entirely met by standard services. In this light, it appears promising for local providers to address the discrepancy between the standardized services of the hyperscalers and the specific requirements of certain customers. For this purpose, local IaaS providers have to preserve a certain degree of flexibility within their IaaS service portfolio, even though this is against the basic logic of cloud computing at a first glance. Of course, customization is associated with additional costs, but a willingness to pay can be expected if an added value can be guaranteed. Particularly local IaaS providers have a great advantage as their organization often is more flexible which allows them to respond faster to individual customer demands.

H3: Offering extensive customer support is positively related to local IaaS provider's ability to compete.
Receiving extensive customer support for the whole cloud service lifecycle is, according to the interviewees' experience, essential for most customers. Especially for local IaaS providers, who have lower innovative strength and limited sources to react on low prices, customer support can be an option to differentiate against the hyperscalers. A lot of customers appreciate a personal contact and are willing to pay extra for high quality support. Support services include services related to the selection, implementation and operation of cloud services. Local IaaS providers should closely work with their customers as they want to call for help anytime a problem occurs. In contrast, the hyperscalers are often criticized for their unsatisfactory support processes. Offering additional support for hyperscalers' IaaS services therefore seems to be a further option which can complement the own service portfolio.

H4: Offering personal sale instead of self-service sale is positively related to local IaaS provider's ability to compete.
On demand self-service is a definitory characteristic of the cloud concept [7]. According to the interview partners, it is associated with possible cost savings as the sales staff can be reduced and standardized contracts can be used. Moreover, the entry bar-

rier of ordering a cloud service and the duration of the process to win a new customer is lowered. For this reason, the self-service option is being enforced by the hyperscalers. However, the experts stated that firms of various sizes differ in their acceptance of self-services: whereas small companies often decide to use the self-service option, medium-sized and large companies commonly prefer personal contact to the provider combined with individual contract negotiations. In general, the self-service variant only makes sense in combination with standardized cloud services when no individual adjustments are needed. In addition, practice shows that several clients have difficulties in using the self-service order process. The main reason for this is a lack of skills on the customers' side. Summarized, it seems to be promising for local IaaS providers to put more emphasis on personal sale and direct interaction with customers.

H5: Offering managed services as an extension of basic IaaS services is positively related to local IaaS provider's ability to compete.

Standard IaaS services consist of basic virtual compute, storage and network resources. Besides that, there is, according to the experts, a growing market for managed services. Managed services are IaaS services that entail an extension comprising elements such as update, monitoring or backup services. The main reason for the popularity of managed services is a lack of skills on the customer's side. Especially among firms that formerly were traditional IT outsourcing customers a high demand for managed services can be found. These companies are used to pass the responsibility for the complete IT operations on to the provider. Innovative start-ups, in contrast, often prefer basic IaaS services. Overall, it appears auspicious for local IaaS providers to profit from this growing market for managed services. The managed services can be delivered on the basis of the own as well as the hyperscalers' basic IaaS services. In practice, more and more hyperscalers actively mandate smaller partner firms to take over the managed service part for their IaaS services.

H6: Offering multi-cloud management and reselling of hyperscalers' IaaS services is positively related to local IaaS provider's ability to compete.

The interviews showed the growing importance of enabling and offering multi-cloud management. The underlying idea is to offer one's own IaaS service and additionally act as a broker for other providers. This is because of the simultaneous use of IaaS services from various providers by the majority of the medium-sized and large companies: Some SaaS services need to be deployed on the IaaS/PaaS platform of the respective provider. Furthermore, employees sometimes order IaaS services without prior approval by the IT department. And last but not least, customers try to avoid vendor lock-in. For local IaaS providers, this leads to opportunities to benefit from the cooperation. A prerequisite is that local IaaS providers make sure that their IaaS services are compatible with those of the hyperscalers. In addition, providers have to develop and offer a tool to centrally control the various utilized IaaS services and to orchestrate workloads between different clouds. By the means of multi-cloud management, customers will be served by a single point of contact. Offering multi-cloud management is, however, a challenge, mainly due to the lack of uniform standards between the leading IaaS providers. It seems to be reasonable to additionally act as a trusted advisor. This means that the provider tries to select an appropriate IaaS provider for the customers' specific requirements.

H7: Offering private and hybrid cloud deployment models is positively related to local IaaS provider's ability to compete.
The demand for private cloud solutions is currently significantly higher than for public clouds. Private clouds are preferred due to data protection, security, availability, regulation and compliance reasons. In addition, a private cloud allows a substantially higher degree of customization which customers often demand. One way to realize a private cloud is a dedicated environment in the provider's data center. Another solution could be to deliver the cloud platform as a bundle consisting of soft- and hardware components which then will be integrated in the customer's data center. The interviewees emphasized that the private cloud has to be necessarily considered together with the public cloud offering. This means that the public cloud complements and expands the private cloud, so that customers can shift workloads between the different systems easily. Clients can thus choose the right time to move from private to public cloud. The interview partners also stressed that the restriction on public cloud services is not recommendable at the moment. The hyperscalers also offer private clouds, but primarily focus on public deployment models. For local IaaS providers private clouds are therefore a must in their cloud service portfolio.

H8: Using an open source IaaS platform is positively related to local IaaS provider's ability to compete.
The majority of the hyperscalers utilize a proprietary IaaS platform. This can, however, have a deterrent effect on certain customers. To use an open source IaaS platform instead, e.g. Open-Stack, gives advantages to both clients and providers. This would help to avoid the well-known vendor lock-in. By using an open source IaaS platform, clients can easier switch from one IaaS provider to another, if both providers support the open standard. In addition to that, IaaS providers can save the royalty payments. These savings can be passed on to the clients. Providers who are actively involved in the open source community will benefit from the accumulated know-how. They receive regular updates on improvements and participate in the sharing of experiences and best practices. Finally, open standards are a prerequisite to realize cloud native microservices for SaaS solutions. Of course, small and medium-sized local providers can hardly afford to build an IaaS platform from scratch. Nevertheless, it can make sense to adapt the basic version of an open source IaaS platform. Due to the above-mentioned advantages, an open source platform seems to be an auspicious option for local IaaS providers.

5 Discussion

The results show that IaaS providers who exclusively offer their services within one country or region have clear advantages: they can focus on local regulations and security concerns. IaaS providers addressing a broader or even a global market face the challenge of fulfilling all these various country-specific requirements at the same time. The common approach is to establish a central and uniform cloud platform, hoping that it will meet most customers' demands with only slight country-specific adaptions. Nevertheless, a global IaaS provider usually needs more time to adapt to

the rapidly changing market conditions compared to the local providers. Due to their smaller company size, local IaaS providers are much more flexible.

However, the hyperscalers benefit strongly from their company size in another way: they can pass the savings generated through economies of scale and technological progress on to the customers. Local IaaS providers cannot compete with the hyperscalers without adapting their business model because they are unable to keep up with technological innovations in the price-sensitive IaaS market. Therefore, it is mandatory for local IaaS providers to stand out by other features. According to the eight formulated hypotheses, local providers should focus on providing additional services beside their basic IaaS services. Additionally, in cooperation with the hyperscalers, it seems to be promising for local IaaS providers to take over the managed service part for hyperscalers' IaaS services and to act as a broker for hyperscalers by offering multi-cloud management. Moreover, it is necessary to offer private and hybrid clouds together. Finally, the use of an open source IaaS platform is associated with numerous advantages, in particular, the avoidance of a vendor lock-in and the support of cloud native applications.

However, at this point it has to be noted once again that the recommendations are intimately connected with the current business models of the hyperscalers and the existing customer demands. This means in reverse, if the hyperscalers radically modify their business models or customer demands change fundamentally, the propositions for local IaaS providers will also be affected. Figure 2 summarizes the hypotheses on the impact of business model characteristics concerning the competitive strength of local IaaS providers in a model.

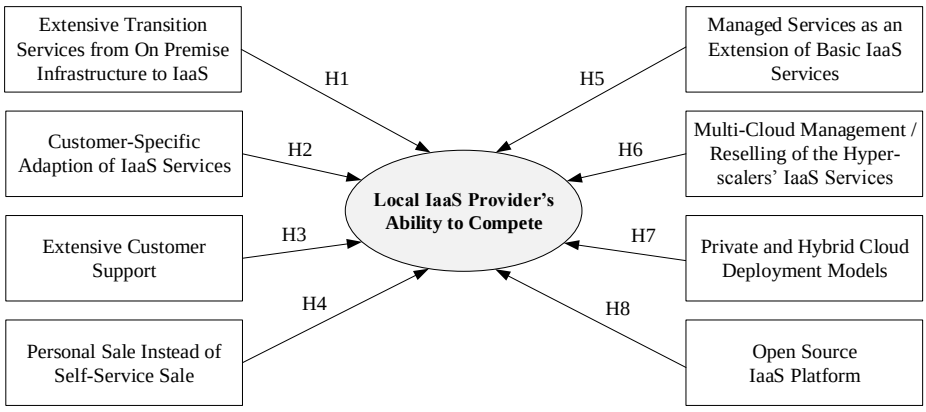

Fig. 2. Hypotheses on Differing Business Model Characteristics for Local IaaS Providers

A major improvement of the situation could be, to additionally take over the role of a PaaS provider. In contrast to IaaS, PaaS offers considerably greater opportunities to generate unique selling proposition and thereby, to differ from other providers. The interviewed experts stated that PaaS is becoming increasingly popular among customers as they can immediately use fully-fledged cloud services. This means, a growing number of providers have ready-to-use PaaS services in their portfolio, which cus-

tomers formerly had to develop on their own upon an IaaS service. As PaaS often includes elements of machine learning and artificial intelligence, it can provide considerable added value for customers. However, it has been also warned because of the requisites and skills needed for a successful implementation in the PaaS segment. Especially for local providers it is difficult to cope with the innovativeness and speed of the hyperscalers.

It is evident that focusing on the proposed business model characteristics will not transform a local IaaS provider into a global player. The interview partners agreed that this opportunity is no longer given since the hyperscalers are too far ahead. Instead, the business model characteristics should be regarded as orientation help or recommended scope of actions for local IaaS providers to remain competitive. Although some business model characteristics (**H2**, **H3**, **H4**, **H5**) result in higher prices compared to the basic IaaS services from the hyperscalers, a sufficient amount of customers will pay for the significant added value. Nonetheless, the experts predict a shrinking market for local IaaS services. This prediction is mainly based on the assumption that the global players will continue to reduce their prices aiming to kick smaller competitors out of the market. In addition, cloud certificates are gaining importance in the IaaS field and their influence on purchase decisions is expected to increase further in future. Certificates are often demanded within tendering procedures and decision makers will rely on a certified IaaS provider. However, as the procedure of obtaining a certificate is time-consuming and expensive, small and medium-sized local providers are not able to compete in this regard. Because of this, a further growing market consolidation is very likely in the next years. If this happens, the IaaS market is, according to the experts, expected to become subject of governmental regulations, similar to the market for electrical energy. Otherwise, the hyperscalers would use their dominance for arbitrary pricing.

6 Conclusion

This paper addressed the research question of "**What are business model characteristics for local IaaS providers to successfully differ from the hyperscalers in order to ensure their long-term competitiveness within the cloud computing ecosystem?**" Following the fundamental principles of the grounded theory approach, the study's results comprise eight hypotheses on business model characteristics specifically related to local IaaS providers. These hypotheses were derived from 21 exploratory expert interviews with representatives from 17 cloud providers. In detail, local IaaS providers should offer additional services on top of their basic IaaS services. This includes supporting the transition from on premise infrastructure to cloud-based IaaS solutions, but also customer-specific adaption of IaaS services, extensive customer support for the whole cloud service lifecycle, a personal sales contact instead of self-service sale and managed services. Summarized, many customers value personal attention. Moreover, there is the promising option to cooperate with the hyperscalers: local IaaS providers may to take over the managed service part for hyperscalers and act as a broker for them by offering multi-cloud management. Further recommended

actions regard the mix of deployment models, open source platforms and including PaaS in the service portfolio.

Overall, the study provides first insights into business model characteristics which influence the local IaaS provider's ability to compete. Practitioners obtain recommendations and hints that can be useful for improving current business models. The findings, however, have some limitations: First, the geographic scope of interviewed experts was Germany. Second, the hypotheses mainly focus on the value propositions, whereas other business model components, such as revenue streams or customer segments, were not mentioned. They could play a role and future studies, therefore, should address these limitations.

Despite of the results achieved, there remains a substantial need for further research: First, the eight business model characteristics are initial hypotheses, which have to be empirically tested. As not all business model characteristics are of equal importance, their relevance might be investigated in a second step. Of course, this exploratory study cannot claim to have identified all possible impact factors for local IaaS providers. Therefore, it is thirdly necessary to research further business model features which contribute to the market position of local IaaS providers.

It will be interesting to watch the evolution of the IaaS market: Firstly, how long can the local IaaS providers withstand the pressure of the hyperscalers and to what extent will the forecasted market consolidation indeed happen? Secondly, will we see changes of the IaaS business models in the light of the growing diffusion of cloud native applications? Furthermore, an exciting question is whether PaaS and SaaS will also become a commodity over the next years.

To conclude, despite the undoubtedly difficult market situation for smaller, local IaaS providers, the authors are quite optimistic that there will always be a niche market for them, if they obey their specific strength which corresponds to the business model characteristics described in this paper.

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