Strategic Design of Technology-Based Startup Platforms: From the Perspectives of Innovation Approaches and Knowledge Management

Dongdi Chen

Warwick Business School, University of Warwick

Abstract In recent years, the rapid development of digital technology has greatly promoted the digital transformation of traditional enterprises and stimulated the emergence of new business models. Digital platform has become a typical representative of novel business models with the unavoidable trend of value creation based on information and data. Along with the advent of digital era, innovation and knowledge management have been widely identified as two critical facilitators for each company seeking to remain competitive and grow constantly, especially for startups. Thus, the objective of this paper is to summaries the beneficial and transferable experience of strategic design of technology-enabled platforms from the perspectives of innovation approaches and knowledge management. Through the analysis based on theoretical framework and business practice, we extract certain principles of design in terms of open innovation, design thinking, crowdsourcing as well as knowledge management activities, aiming at enhancing startups' capabilities through strategy design.

Keywords: Digital Platforms, Open Innovation, Crowdsourcing, Knowledge Management, Competitive Advantages

1 INTRODUCTION

Innovation is widely identified as a critical competitive facilitator for each company seeking to remain competitive and grow constantly (Peter, 1985; EU European Commission, 2004), especially for start-ups that correspondingly play a vital part in innovation processes (Colombo and Pivo, 2008; Davila, Foster and Gupta, 2003; Mustar, Wright and Clarysse., 2008). As a result of innovation at the organizational model level, digital platforms, represented by Booking and Airbnb, have gradually become a new carrier of value creation with both large and systematic user communities as well as core interactive activities between users that promote value creation (Parker et al., 2016).

Like other startups, platforms are confronted with the problems of resource scarcity and brand recognition, which severely inhibit the platform's adaptability to the dynamic and complex external operating environment for sustainable growth. According to Wymer and Regan (2005), the problem of structural lacking in both physical and intellectual resources most startups face arises from their smallness, which

necessitates open innovation practices in order to overcome both the liability of newness and the limitation of smallness (Bogers, 2011) through establishing relationships with a wide range of external partners. Simultaneously, the capacity of an organization to gain knowledge externally is a significant contributor to its competitive edge. (Kogut and Zander, 1992; Hamel and Prahalad, 1990; Starbuck, 1992). However, not all the ideas and knowledge gained from external sources can strategically cater to the requirements of the platform's internal operation or address specific problems. Therefore, innovation should be implemented along with proper knowledge management activities based on the internal factors of the platform, such as technological capabilities and ethic regulations, so that feasible ideas and knowledge can be smoothly integrated into the innovation process model adopted by the platform to create more value. Put simply, how to combine open innovation, agile methods (Cervone, 2011), and knowledge management properly within the innovation process model to enhance the transfer of tacit knowledge and innovation capabilities is the core issue in startup platforms' strategic design

With the rapid development and wide application of digital technologies, an increasing number of companies have introduced technologies to promote digital transformation

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(Fitzgerald et al., 2014). However, business history is full of examples where an inferior technology outperformed an advanced technology in business application (Cusumano, Mylonadis and Rosenbloom, 1992), which results from differences in the innovation process models employed to commercialize the different technologies. Therefore, although technologies are vital enablers for startups to build competitive advantages, the benign interaction between technology and organization behavior, rather than the introduction of technology alone, is the guarantee for the successful operation and logical growth of the platform to larger degree.

Thus, from the perspectives of innovation and knowledge management, two strategic organization behavior, the objective of this article is to summaries the beneficial and transferable experience of strategic design of technology-enabled platforms from the perspectives of innovation approaches and knowledge management, aiming at enhancing innovation capabilities through strategy design. Sector 2will analyses discuss the strategic design from the perspective of the innovation approaches, including the open innovation model, as well as aspects of design thinking and crowdsourcing within open innovation. The analysis in Sector 3 will focus on knowledge management strategies on the basis of technologies and collaborative approaches, especially the transfer of tacit knowledge in knowledge utilization.

2 STRATEGIC DESIGN: FROM THE PERSPECTIVE OF THE INNOVATION PROCESS

2.1 THE ADOPTION AND IMPLEMENTATION OF INNOVATION PROCESS MODELS

Although most companies have realized the importance of innovation and thus invest a lot of resources in product or service innovation, few companies can obtain expected returns or form competitive advantages through the innovation process (Du-Preez and Louw, 2008). A key reason for this low output-to-input ratio lies in the fact that most companies lack successful management of innovation process from generating novel ideas to delivering improved product or service into the dynamic market (Kemp et al., 2003; Van-der-Panne, Van-Beers and Kleinknecht, 2003). In this case, itis critical to adopt a suitable innovation process model to help enterprises proactively manage innovation activities by incorporating most elements of successful innovation, such as market trends and customer preferences, into the stage-by-stage approval process (Du-Preez and Louw, 2008). As mentioned above, one typical organizational characteristic that differentiates platform from traditional enterprises is a large amount multilateral user, such as provides, customers, and third parties, from web-based or crowd-based communities where they interact and transfer value at a relatively lower cost. Thus, open innovation model, which was firstly introduced by Chesbrough (2003), and prioritized a network approach where innovation is focused not only

internally, but also externally should be given priority within strategic design around the starting point of enhancing the core interaction of users. Overall, the open innovation model could provide startups with the basic elements of strategic design, such as idea generation, concept evaluation, and R&D, thus paves ways for the adoption of design thinking tools and crowdsourcing in crucial stages, which we will elaborate on in the subsequent parts.

According to Du-Perez and Louw (2008), the open innovation model advocates a new logic that prioritizes openness and collaboration at the core, thus it is an innovation management tool worth adopting for other web-based and crowd-based platforms with multilateral users to a certain extent. However, the open innovation model relatively attaches importance to the interaction of internal and external participants across the organization and simultaneously does not take into account the exploitation of the new innovation within the market, which is crucial to gaining the position on the market and ensuring financial survival (Du-Preez and Louw, 2008). Therefore, open innovation platform cannot provide a 'one size fits all' solution for web-based platforms, and each platform should take internal and external elements into account within its specific strategy framework when adopting the innovation process models for management.

2.2 ADOPTING DESIGN THINKING IN IDEA-GENERATING AND CONCEPT EVALUATION

After adopting open innovation model as innovation management road map, the first and foremost problem required to be solved is to determine the value propositions as well as the resources and capabilities that are conducive to the realization of value propositions according to the social background and market conditions. At this stage, the design thinking model (Wrigley, Nusem and Straker, 2020) with a non-linear process, including Empathies, Define, Ideate, Prototype, and Test, is conducive to addressing this type of design-related problems through iterative generating ideas and evaluation. For example, when we defined food-wasting as the problem we attempt to address through platform that help donate and distribute excess food, we could generate many ideas of value propositions by virtue of brainstorming and filtered them in terms of feasibility and market situations with the help of other analysis models, based on which, we created a prototype and tested our assumptions with available potential users to facilitate co-creation and iterative improvement on design through collecting their feedbacks.

Although the design thinking model could help identify reasonable and innovative value propositions, certain inherent limitations existing in the implementation process of design thinking and the further improvements require careful consideration. Firstly, the evaluation of prototype's feasibility requires all-round considerations in terms of internal and external situations in the text phase. For example, if we mainly evaluated the feasibility of the proposed value proposition in terms of people desirability, which focuses on navigating whether or not the potential users desire this service, we may run

the risk of ignoring the limitations of technical and resource at disposal. In fact, technical availability is another crucial factor in determining whether proposed value propositions are feasible. Ianthe startup phase, resource scarcity is an unavoidable problem, which necessitates considering whether the existing limited resources and technologies are capable of achieving value propositions in addition to singly considering whether there is a market demand for proposed services. Moreover, internal and external conditions, such as technical availability and online community, will not be static in the process of operation and they would strengthen or weaken design implementation to a certain extent (Wrigley, Nazem and Straker, 2020). Therefore, design thinking should be constantly implemented in the later organizational operation to adapt strategies to ever-changing circumstances instead of singly staying in the decision-making stage of the value propositions. For example, design thinking could be combined with the crowdsourcing strategy to gain novel insights into the long-term improvement, particularly in terms of sources of value creation.

2.3 Adopting Crowdsourcing Within Open Innovation

The idea of open innovation was originally defined by Henry William Chesbrough (2003) as the use of intentional inflows and outflows of knowledge to enhance internal innovation and to expand the market for external use of innovation respectively. This definition reveals the two dimensions of open innovation: 'outside-in' ------where ideas and knowledge from outside the organization were brought into the internal innovation process and ``inside-out'', which means allowing knowledge originating from firm to be incorporated into the innovation process of other firms, including competitors and alliances (Gassmann and Enel, 2004). The 'outside-in' is necessary for startups lacking in knowledge to address problems arising from their smallness (Boger's, 2011), which could be achieved through crowdsourcing to some extent. This essay will adopt the definition of crowdsourcing proposed by Howe (2008), Jeppesen and Lakhani (2010) who defined crowdsourcing as the act of outsourcing tasks or problems to an undefined 'crowd' rather than a nominated agent but in the form of an open call, which will be regarded as social networks in the following context.

Overall, crowdsourcing strategy could help startups overcome the problems of limited information and knowledge related in R&D stage at a relatively lower cost. The effectiveness of knowledge acquisition relies on the scope of implementation and the forms of interaction between multilateral users. For example, web-based platform could adopt various forms of interaction between users as the source of value creation, such as rating systems and satisfaction surveys through popular social media platforms represented by Facebook or Instagram, which is conducive to utilizing the wisdom from a large number of existing users and potential users to optimize current services and promote innovation with the participation of analytic tools. Although outsourcing the problem of service optimization to a wide range of users could help acquire valuable knowledge to

promote innovation on the existing basis, the following problems should be considered simultaneously to ensure a successful implementation crowdsourcing. First, the user community requires expanding so that it covers certain groups with professional knowledge. While users can propose useful ideas for optimizing services based on their experience, when it comes to more complex issues regarding technology compatibility and database maintenance, outsourcing problems to people with professional knowledge will help firms fill the knowledge gap faster and effectively. Another challenge is to build idea filters (Du-Preez and Louw,2008) to develop reliable information sources. In most cases, the implementation of crowdsourcing was based on the prerequisites that all the users are honest and the ideas proposed by them are reliable (Greengard, 2011), however, these assumptions rarely hold. Therefore, constructing idea filters on the basis of organizational conditions will be conducive to reducing the interference of invalid information.

With respect to 'inside-out', forming solid relationships with external partners based on users' data collected plays a vital part in this aspect of strategic design. According to NE yens et al. (2010), ongoing alliances with competitors or collaborators exert a positive effect on startups' ability to yield radical innovation, while discontinuous alliances have a positive effect on startup's ability to develop incremental innovation. Therefore, startup platform should give priority to the dynamic relationships with intermediate partners, such as technology-based service firms and social media enterprises, thus forming a stable relationship network for further R&D. On one hand, platforms could provide the knowledge exploited from its operation, such as customer preferences, for external stakeholders. On the other hand, platform should proactively obtain novel insights into sources of value creation from the collaboration of partners.

3 Strategic Design: From The Perspective Of Knowledge Management

In a digital age, organizational learning capability and knowledge management are gradually becoming key factors affecting competitive advantage. According to prior literature, the capacity of an organization to gain knowledge is a significant contributor to its competitive edge. (Cogut and Zander,1992; Hamel and Prahalad, 1990; Starbuck, 1992). Furthermore, the knowledge-based view highlighted the importance of knowledge management for a firm's competitiveness and strategic renewal (Agarwal and Helfer, 2009; Grant, 1996; Gupta and Govindarajan, 2000; Cogut and Zander, 1992; Mudambi,2002). According to Cabrera and Cabrera (2005) together with Barão et al. (2017), knowledge creation and knowledge transfer are at the center of effective knowledge management processes in organizations. Therefore, this sector will analyse the design of knowledge management strategies of

startup platforms from the perspectives of knowledge creation and knowledge transfer.

3.1 STRIKING A BALANCE BETWEEN KNOWLEDGE EXPLOITATION AND EXPLORATION

Knowledge creation activities consist of two contradictory organizational processes: knowledge exploitation and knowledge exploration (March, 1991). According to March (1991), knowledge exploitation focuses on the application and enhancement of internal existing skills, while knowledge exploration emphasizes at egos based on its resource and capabilities to effectively acquire knowledge. Particularly, AI and other machine intelligence that appear today could to great extent assist platforms in knowledge acquisition. For example, with respect to knowledge exploitation, platform can capture user experience through direct feedback to identify pain points and deficiencies existing in the platform, as well as perform classification and prediction analysis through AI algorithms to improve our internal database for further use on other interest-related business models (Thatcher et al., 2010) and decision-making. On the other hand, with the capabilities of self-study and natural language process features of AI, platform could gain novel insights from external input. Moreover, clustering tools make it easy to discover patterns (Liu and Deng, 2015) and the analysis iteration will assist in improving the algorithms inside to perform better particularly in analyzing the unknown input.

However, the adoption of technologies in knowledge creation also generates a gap between the strategic design of knowledge management activities and the realization of competitive advantages, which is the balance between exploitation and exploration. Prior researches revealed that merorganizations found it challenging to strike an appropriate balance between these two conflicting organizational processes (Adler, Goldoftas and Levine, 1999; March, 1991; Teece et al., 1997) because each process requires concentrated efforts and deployment of limited resources (Gupta, Smith and Halley, 2006). For example, if a startup relies heavily on artificial intelligence to achieve these two sources of knowledge creation, it will pose a great challenge to the organization's limited technical capabilities. Furthermore, the researches of Levinthal and March (1993) indicated that ineffective or inappropriate knowledge creation processes, such as excess exploitation or exploration, could lead to a 'competency trap' which negatively affects the current and possible future' s organizational performance and the formation of competitive edges (Liu, 2006).

In order to strike a balance between knowledge exploitation and exploration at the start-up stage, startups should allocate existing resources equally between knowledge exploitation and exploration, and simultaneously allow dynamic nuances according to unpredictable changes. According to Liu (2006), in a turbulent environment full of uncertainty, organizations are more likely to emphasize too much on exploration to acquire new knowledge and ignore exploitation which creates incremental knowledge with steady but predictable and timeous

returns. As a startup platform in the digital age, placing exploration and exploitation in the roughly equivalent strategic position is conducive to the organization's facilitating existing value propositions and gaining ground with the acquisition of a wealth of novel knowledge.

3.2 KNOWLEDGE UTILIZATION: PROMOTING TACIT KNOWLEDGE EXTERNALIZATION AND TRANSFER

Another approach to knowledge creation and transfer consists of knowledge conversion(Nonaka,1994) and absorption (Cabrera and Cabrera, 2002) in knowledge utilization, which is related to two major categories of knowledge: tacit and explicit knowledge (Boiserie and Lethe, 2008).According to Nonaka et al (1995), tactic knowledge relates to deeply personal knowledge that is deeply embedded in both activity and dedication under specific circumstances and thus difficult to codify and express, which resides in organization's intangible facets: beliefs, common know-how deeply incorporated into daily operation, etc. (Nonaka 1994; Nonaka et al., 1995).

Tacit knowledge externalization and transfer constitute key parts of the organization's innovation capabilities (Cavusoglu, Colantoni and Zhao, 2003). Therefore, to enhance the abilities of tacit knowledge externalization, startup should expand the scope and forms of knowledge sharing activities to make a wider range of people have diversified access to transfer work-related knowledge. Firstly, startups should suitably increase the frequency of interaction with its external partners, such as advertisers and technology-based service firms, to establish mutual trust (Kratz, 1998) in each other through in-depth strategic cooperation, thereby promoting the depth and breadth of knowledge sharing. Moreover, startups should proactively use social media as the main tool to promote knowledge conversion and sharing, such as building corporate blogs and LinkedIn profiles to allow employees to externalized their tacit knowledge by sharing personal experiences and work-related insights (Lee, Liman Grabowski, 2010), particularly facilitating the communication between heterogeneous teams members with different knowledge skills, which will be efficient for tacit knowledge externalization transfer (Marm-Garcia and Zarate-Martinez, 2007; Sapped et al., 2002).

4 CONCLUSION

Overall, this article offers certain principles of strategic design of startup platforms in the digital rain terms of two crucial organization behavior: Innovation and Knowledge Management. It is worthwhile noting that the elements discussed within these two strategic frameworks, such as design thinking and crowdsourcing within open innovation models, are not 'one-size-fits-all' strategies that could help startups adapt themselves to any dynamic situations. However, as opposed to technology-based innovation approaches discussed above, leaving both the companies and organizers open to the ever-changing environment and proactively embracing the changes should be

rooted in the strategic design and operational process in the digital age.

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