Association for Information Systems
AIS Electronic Library (AISeL)

ICIS 2022 Proceedings | AI in Business and Society

Dec 12th, 12:00 AM

Leveraging an Ecosystem for the Development of AI Applications

Xuetao Wang
The University of Sydney, xwan4634@uni.sydney.edu.au

Cheuk Hang Au
National Chung Cheng University, allenau@ccu.edu.tw

Evelyn Ng
The University of Sydney, evelyn.ng@sydney.edu.au

Barney Tan
The University of New South Wales, barney.tan@unsw.edu.au

Follow this and additional works at: https://aisel.aisnet.org/icis2022

Recommended Citation

Wang, Xuetao; Au, Cheuk Hang; Ng, Evelyn; and Tan, Barney, "Leveraging an Ecosystem for the Development of AI Applications" (2022). *ICIS 2022 Proceedings*. 12.
https://aisel.aisnet.org/icis2022/ai_business/ai_business/12

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2022 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Leveraging an Ecosystem for the Development of AI Applications

Short paper

Xuetao Wang
The University of Sydney Business School
The University of Sydney
xwan4634@uni.sydney.edu.au

Cheuk Hang Au
Department of Information Management
National Chung Cheng University
allenau@ccu.edu.tw

Evelyn Ng
The University of Sydney Business School
The University of Sydney
evelyn.ng@sydney.edu.au

Barney Tan
UNSW Business School
UNSW Sydney
barney.tan@unsw.edu.au

Abstract

Artificial Intelligence (AI) is becoming increasingly essential for enhancing many conventional business processes and generating market opportunities. And yet, for AI to truly gain mainstream acceptance, there is a need to develop a vast array of different applications to cater to the myriad needs of the market. This, however, cannot be achieved by any AI firm in isolation. Instead, there is a need for the collectivization of a synergistic ecosystem of entities. How such an AI ecosystem is developed, however, has not been the subject of research to date. To address this gap, we conducted a case study of iFlytek, one of the most successful AI firms in China and the world. Based on our ongoing study, we developed a theoretical framework that illustrates the stages of AI ecosystem development, which can provide guidelines for other technology firms and policymakers on the orchestration and governance of market-driven AI applications.

Keywords: Artificial intelligence, digital ecosystem, ecosystem development, case study, China

Introduction

Artificial Intelligence (AI) refers to the ability of machines to perform the cognitive functions typically associated with humans, which include perceiving, reasoning, learning and interacting (Rai et al. 2019). It is a pervasive economic, social, and organizational phenomenon facilitated by big data, cloud computing and other emerging technologies (Chen et al. 2012). The rise of AI has altered and enhanced many conventional business processes (Ransbotham 2018), generated numerous business opportunities and disrupted many industries (Kiron and Unruh 2018). For example, in many financial institutions, AI has been used to detect and prevent fraud (Ransbotham 2018), whereas in the healthcare sector, AI has also enabled rapid business growth and revolutionized the business models of health services (Garbuio and Lin 2019). Overall, the enterprise adoption of AI has grown 270% between 2015 and 2019 with estimates revealing that, by this point, around 37% of all organizations, including large corporations and small-medium enterprises, have adopted or implemented AI systems in some form (Gartner 2019).

While the rise of AI has been significant, for the technology to gain mainstream acceptance, there is a need to develop a vast array of different applications to cater for the myriad needs of the market (Brynjolfsson

and Mcafee 2017). This cannot be achieved by any AI firm in isolation because a single entity will typically not have the resources and capacity be able to develop the required variety of offerings (Adams et al. 2012). For instance, an AI firm may have developed advanced and technically superior algorithms, but the development of AI applications will require the integration of data and domain knowledge owned by other stakeholders as well (Adams et al. 2012; Pandya 2019). In other words, an ecosystem of entities is needed for the creation of AI-based innovations. However, the development of such an AI ecosystem, especially from a longitudinal perspective, has not been the subject of research to date. Addressing this knowledge gap is vital, because if the disparate and diverse entities of such an ecosystem can collectivise and pool their capabilities and resources toward the development of AI applications, the potential quality and quantity of the applications may be enhanced to address the market needs more fully (Quan and Sanderson 2018; Tan et al. 2015). Indeed, reality is replete with instances of failed AI application development because of the lack of a functioning ecosystem. One of the best known examples is the discontinuation of Google Health in 2018, which was due to an over-emphasis on the technical aspects of the project at the expense of the healthcare aspect (Moreno 2021).

To address the knowledge gap surrounding the development of an AI ecosystem, we conducted a case study of iFlytek, one of the most successful AI firms in China and the world. iFlytek is an especially appropriate case because not only is the organization a recognized technology leader in the global AI arena (Zhu 2019), but it has established and nurtured a vibrant ecosystem of tech enthusiasts and small businesses as well. The collective resources of the ecosystem, in turn, were marshalled to develop a commercially successful suite of products for a variety of different domains such as education, intelligent appliances, law enforcement and financial services, making it a revelatory or extreme case (Gerring 2008) for the purpose of our study. Accordingly, the research question that we will address in our proposed study is: How does the development of an AI ecosystem unfold?

Literature Review: Artificial Intelligence (AI) Applications

Mirroring the rise of AI in the present age, the research attention on AI applications is similarly growing at an exponential pace. In particular, a review of published and working papers on AI applications revealed that the majority of the emerging studies can be classified into three research streams (refer to Table 1). The first stream is related to the adoption of AI applications and studies that fall under this category are typically seeking to identify the factors that will promote the users' acceptance of these applications while minimizing their resistance. To cite some examples, Chatterjee et al. (2021)) discusses the importance of Organizational competency, organizational complexity, organizational readiness organizational compatibility, competitive advantage and partner support to the adoption of AI applications in the context of manufacturing firms, while Reis et al. (2020)) argue for the importance of mitigating cognitive and emotional resistance to AI when the technology is applied for healthcare.

The second stream is related to the development of AI applications, and the existing works that belong to this stream are aimed at articulating the principles, best practices and enabling factors that underpin the process. For instance, leadership from someone in a CXO capacity is acknowledged as a critical ingredient to the success of AI application development because it promotes a positive orientation toward the technology (Li et al. 2021; Sipior 2020). In a similar vein, Tarafdar et al. (2019)) argues that there has to be broad-based participation among organizational stakeholders to facilitate the identification of potential issues in the early stages of development. The applications also has to be continually refined, perhaps through the self-learning capabilities of the underpinning algorithms (Adams et al. 2012), so as to maintain the value and accuracy of the applications and their alignment with organizational goals.

The third stream is related to the implications of AI applications, focusing on the benefits and consequences of using the technology across a variety of application domains. To illustrate, Brynjolfsson and Mcafee (2017)) described how AI can be applied for fraud detection, recommendation systems, speech recognition and face recognition, while the benefits of the technology in the areas of healthcare (Garbuio and Lin 2019). and education (Hao 2019) are also well documented, especially in terms of the effectiveness and efficiency of the related business processes (Garbuio and Lin 2019).

Source	Argument
Adoption of AI Applications	
Quan and Sanderson (2018)	The successful adoption of business AI applications will require the managers to design AI user scenarios based on customers' applications of the products and services, to acquire data for AI applications for continuous refinement of the products and services, and to build an AI business ecosystem for engaging customers.
Reis et al. (2020)	In the context of healthcare AI applications, organizations should seek to reduce cognitive and emotional resistance to AI for users, including being fully transparent about application capabilities and limitations, hiring people with application domain expertise, and openly communicating AI implementations program expectations
Chatterjee et al. (2021)	Organizational competency, organizational complexity, organizational readiness organizational compatibility, competitive advantage and partner support are all factors that are crucial to the adoption of AI-based smart systems in the context of manufacturing firms.
Development of AI Applications	
Adams et al. (2012)	The refinement of artificial general intelligence (AGI) applications should be accomplished by the self-learning capabilities of the algorithms themselves and the collaborations between data scientists, domain experts, algorithm designers and other parties.
Tarafdar et al. (2019)	The development of AI applications in support of business operations should involve different functions of the organizations for ameliorating the organizational problems and thus maximizing the value of AI applications. Additionally, given the rapid external environmental changes, the refinement of algorithms and applications is essential for AI adoptions to ensure its accuracy and alignment with organizational goals.
Sipior (2020)	The development of healthcare AI applications will benefit from the presence of a Chief AI Officer, the consideration of bias in AI algorithms, the availability of other AI applications that can be repurposed, high quality data, and a diverse development team.
Li et al. (2021)	In the context of digital transformation, the development of AI applications is influenced by an AI orientation, which in turn is positively affected by the presence of a CIO. Board educational diversity, R&D experience, and AI experience all moderate the latter relationship positively, but these are contingencies that influence AI orientation and not traditional IT orientation.
Implications of AI Applications	
Brynjolfsson and Mcafee (2017)	Examples of AI applications in business contexts include fraud detection, recommendation systems, speech recognition and face recognition. These applications are largely enabled by the huge amount of data and machine learning systems so that the applications will continuously improve themselves.
Garbuio and Lin (2019)	In the context of healthcare, AI applications may refine themselves by learning from data in various medical cases and patients' portfolios. This may enhance operational effectiveness and efficiency, patient satisfaction, and administration performance.
Hao (2019)	AI educational applications may personalize students' learning experiences in response to their weaknesses and may thus spur positive affective states and ward off negative ones for all students.

Table 1. Selected Studies on AI Applications

Overall, the successful adoption of AI applications is expected to help a firm create a virtuous cycle of AI, where the development of AI applications will be refined over time (Tarafdar et al. 2019) with the accumulation of quality data that will unlock even more organizational benefits and positive consequences (Sipior 2020). For instance, more users may be attracted to use the AI applications, which will provide the firm with even more data (Brynjolfsson and Mcafee 2017). Consequently, the AI-relevant capabilities of the firm will be strengthened iteratively, and the business value brought by adopting AI will correspondingly increase (Tarafdar et al. 2019) while the perceived advantages of adopting AI (Chatterjee et al. 2021) are reinforced.

And yet, of the emerging studies on AI applications, very few of them have examined the phenomenon from an ecosystem level of analysis even as the importance of this perspective is well-recognized (Pandya 2019) One exception is the work of Quan and Sanderson (2018)), who describe the key components or an AI

ecosystem including open source software platforms, AI core technologies, and AI open platforms but the nature of the ecosystem itself is only described briefly and their prescriptions have not been substantiated by empirical evidence. Another example is the literature review of Reim et al. (2020)) who argue for a thorough consideration of the ecosystem roles (e.g., ecosystem orchestrator, direct value creation roles, value creation support roles, and entrepreneurial roles) taken on by the relevant stakeholders. Once again, notwithstanding the academic and practical contributions of their work, their arguments and propositions have not been empirically corroborated and can only remain in the realm of speculation. To address this knowledge gap, the purpose of our study is to conduct a thorough investigation of the process through which an AI ecosystem can be developed so as to generate AI applications in sufficient quantity and quality to meet the needs of the market. In the following sections, we will present our research method and the preliminary findings from our ongoing study.

Research Method

The case research method was adopted for our proposed study for two reasons. First, case research is highly suited for exploratory research (Siggelkow 2007). This is particularly relevant for our case study as AI ecosystems are an emerging phenomenon where there is little existing knowledge (Eisenhardt 1991). Second, the case research method is especially appropriate for addressing 'how' questions (Walsham 2006), and our study was centered on a "how" question that looks at the process of AI ecosystem development. We identified two criteria to select the organization that would be the focus of our case study. First, the selected organization should be a successful AI firm that has developed and leveraged an AI ecosystem to achieve a significant measure of commercial success. This is because we are seeking to develop theories based on proven, if not best, practices (Tan et al. 2015). Second, the case organization should ideally have pursued diverse options and initiatives in the development of its AI ecosystem development so that we are able to theorize based on a variety of organizational actions. Based on these criteria, we selected iFlytek as a revelatory or "extreme" (see Gerring 2008, p. 653) case for our case study. Initially focused on voice recognition technologies, Flytek has gradually expanded their research and development in other AI technologies and applications to cover an extensive domain range, such as education, smart cities and healthcare, meeting our second criterion. In turn, iFlytek has become a leading AI firm in the world, and was listed as one of the 50 smartest companies in the world by MIT Technology Review in 2019 together with other technological giants such as Amazon and Facebook, meeting our first case selection criterion.

Data Collection and Analysis

Research access was granted in July 2019, and has been ongoing over the last two years. The study was divided into two main phases: a preparatory phase and a fieldwork phase. The focus of the preparatory phase was to collect and analyze data from a variety of secondary sources to gain an overview of the case organization. The ongoing fieldwork phase is to collect primary data that are specific to our research question and explore in depth the process of AI ecosystem development (Pan and Tan 2011). Interviews were the primary means of data collection (Myers and Newman 2007) during the fieldwork phase. 27 informants have been interviewed to date, including representatives from iFlytek's top management, organizational IT function, ecosystem partners, and various internal business units. Each interview took an average of 60 minutes, and was conducted with the help of a semi-structured interview guide (Myers and Newman 2007) that had a set of standard questions (Ferlie et al. 2005) with respect to its AI applications and the development of its AI ecosystem. There were also specific questions for each informant that were tailored based on their role within the organization (Pan and Tan 2011). All the interviews were recorded, transcribed in Chinese, and translated for data analysis.

Data analysis is being performed concurrently with data collection to take full advantage of the flexibility that the case research method affords (Eisenhardt 1989). This process involved the use of grounded theory techniques where a mix of open, selective and theoretical coding were adopted (Urquhart 2001). More specifically, open coding was first used to assign conceptual labels to our interview data (e.g., "Identification of iFlytek fans" was one of our first-order concepts, which described fiercely loyal users of iFlytek's applications who were able to contribute to product development as well) to create first-order concepts (van Maanen 1979). Next, selective coding was used to abstract the first-order concepts into second-order themes (e.g., "Identification of iFlytek fans" was abstracted as "Recognizing individual power users") that represented our interpretation of the data (Gioia et al. 2013). Finally, theoretical coding was then used to distil our second-order themes into a number of aggregate dimensions (e.g., "Recognizing individual power

users" was categorized as "Engagement of Ecosystem Entities"). The visual mapping and narrative strategies were also used to organize our data (Langley 1999). The former involved documenting the key development milestones if iFlytek's AI ecosystem as well as the initiatives enacted in relation to its strategies and activities in different stages in diagrams, while the latter entailed developing textual summaries of the key events, activities and decisions that transpired. Both were effective summary devices to manage the data collected, and were verified repeatedly with some of our informants to validate our interpretation of the case evidence (Klein and Myers 1999). The process of iterating between data, analysis and theory development will continue until the state of theoretical saturation is reached (Eisenhardt 1989).

Preliminary Findings

The preliminary findings from our ongoing study suggest that the development of an AI ecosystem is a process that unfolds across three stages (refer to Figure 1). Moreover, there are at least seven ecosystem entities beyond the core AI form that had to be part of the ecosystem, including (1) external developers, (2) data providers, (3) domain experts, (4) corporate customers, (5) third party users (i.e., the customers of the corporate customers), (6) casual individual users, and (7) power individual users who not only use the AI applications of the core AI firm, but contribute to their development as well. In the following sub-sections, we will delve into the specifics of our findings to explain how the AI ecosystem is developed and how these stakeholders are engaged across the three stages.

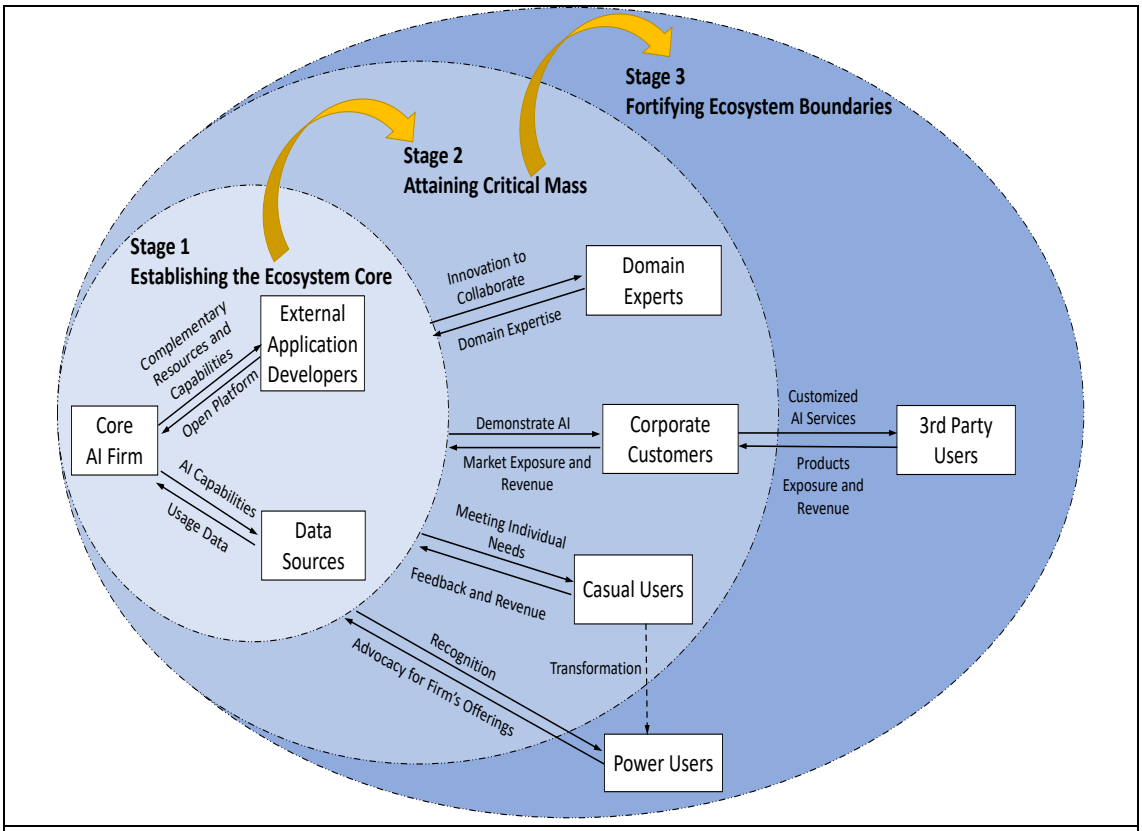

Figure 1. The Development of the AI Ecosystem of iFlytek

Stage 1: Establishing the Ecosystem Core

Our findings suggest that the development of an AI ecosystem begins with the accumulation of certain core AI capabilities (Quan and Sanderson 2018), which echoes the recommendation of Ryder (2019)) about the importance of resource management for effective AI implementation. More specifically, at iFlytek, their technical strengths in voice recognition and synthesis technologies served to attract **external application developers** passionate about the technology to the ecosystem, becoming its initial adherents. For instance,

in 2010, iFlytek introduced a voice input method that allowed users to type Chinese characters through a speech-to-text function. Beyond its voice recognition and synthesis technologies, iFlytek also started developing its capabilities in various other AI technologies. The Brand and Marketing General Manager if iFlytek described these AI capabilities using the metaphor of the roots of a tree, which were vital for their diversified range of AI applications: "The tree root is the foundation and core technologies…on top, the tree branch and flowers are (the AI applications products) of our major focus areas and our open platform".
In addition to their voice recognition and synthesis technologies, iFlytek has also gathered the data from diverse sources (Pandya 2019) to train their AI algorithms by establishing an online crowdsourcing platform called "AI Note. Within this platform, there was a diversified range of tasks, such as the recognition of speech and characters in different languages and dialects, as well as English language proofreading. Users who were recruited served as **data sources** who would be rewarded based on their performance in terms of accuracy and the number of tasks accomplished. But to truly broaden the range of their applications, iFlytek also had to consider the usage of these technologies in multiple domains such as education, finance, and healthcare, and would require knowledge specific to those areas (Tarafdar et al. 2019). To "open these doors" in the words of its Brand and Marketing Director, iFlytek introduced an "AI open platform", a cloud computing platform that allowed various external developers to access iFlytek's various AI tools and standards (Debortoli et al. 2014). According to the AI Research Institute Executive President, this platform would address the capabilities gaps of the external application developers, and enabled them to develop their own AI applications. He explained: "For individual developers or SMEs, they do not have the capabilities to develop AI technologies by themselves, because investing in AI technologies is costly. Through the AI open platform, developers can freely use our various AI capabilities such as our identification and synthesis tools, and thus they can create some application innovations with them".

With the initial attraction of external application developers and the recruitment of data sources, iFlytek had the core of its AI ecosystem in place, and was able to launch a variety of AI applications across multiple domains. This allowed iFlytek to engage resources beyond its own organizational boundaries (Bughin and Hazan 2017), and develop an initial suite of offerings that it could now take to the market in the next phase.

Stage 2: Attaining Critical Mass

Leveraging its ecosystem core and its "opened doors", the priority of iFlytek shifted to attracting a critical mass of users (Tan et al. 2015) for its AI Applications. Having recognized that the needs of different domains cannot be addressed by its ecosystem entities unilaterally (Adams et al. 2012; Pandya 2019), iFlytek found that it had to establish relationships with different **domains experts** in order for their AI applications to meet the specific needs of the various application areas. Its Intelligent Education Vice General Manager explained how iFlytek engaged with the domain experts, providing the example of engaging with schools in the context of their education products: "Our Product Managers and AI Engineers will go to the schools to communicate with the teachers regularly. They will give us some recommendations for improving the products from their professional perspective. We will also invite some teachers to participate in our quarterly product seminars and jointly design and polish our products".

Having acquired domain-specific knowledge, iFlytek became more capable of developing AI applications that were fit for purpose, which made their products more attractive to the **corporate customers** (Tarafdar et al. 2019). To persuade the leadership of these corporate customers, iFlytek must demonstrate the value of their applications to them to promote adoption. The Intelligent Medical Care Executive General Manager explained how iFlytek marketed their solutions to the management executives of hospitals: "You have to demonstrate your products, and you need to have clear explanation… I need to show them the system, and tell them the value of our products. They can regulate the diagnosis decision-making of the doctors at the primary care level, while our applications would facilitate the doctors' work during the diagnosis process… You need to grasp the needs and priorities of the customers".

In addition, iFlytek also launched a variety of AI applications for individual **casual users**, such as educational AI applications for helping individual students to identify and address their specific areas of weakness (Hao 2019). Its AI Research Institute Vice-president recalled why and how it addressed those needs: "For individual students or parents, it would be harder for them to use our AI educational applications unless the whole school was using it… In the early years, many students and parents were telling us that they would like us to develop some AI applications for individual usage… Therefore, we

consolidated our experience in serving different schools and developed various AI applications for individual use, such as our AI learning devices".

By engaging these stakeholders in this stage, iFlytek was able to attract a critical mass of users for its range of in-house and externally developed AI applications to ensure the viability of its business. In addition, iFlytek was able to gain a better understanding of the specific needs of different application areas through their relationship with the domain experts, and develop an extended range of AI applications to address those needs.

Stage 3: Fortifying Ecosystem Boundaries

After acquiring a critical mass of users, our findings suggest that a core AI firm should fortify its ecosystem boundaries to lock in both the developers underpinning the ecosystem's value proposition at its core, as well as its base of customers that contribute revenue and resources for the ecosystem's survival (Tan et al. 2009). At iFlytek, this was necessary to prevent their ecosystem entities from joining competing ecosystems (Barua and Mukherjee 2021), which were rapidly emerging at this juncture due to the desire to imitate iFlytek's commercial success and the AI revolution that was generally taking hold across the globe. To fortify its boundaries, iFlytek relied on two crucial initiatives. First, the AI firm helped their corporate customers develop their own AI-enabled products and services, and subsequently acquire the **3rd party users** of their own with these offerings. This served to establish goodwill and deepen their relationship with their corporate customers, while at the same time increasing their market exposure through the broadening of its customer base. The GM of iFlytek's Open Platform described this initiative: "The voice synthesis technology of AutoNavi Maps (China's equivalent of Google Maps) is enabled by our technology. When you are using their mobile app, the voice directions getting you to turn left or right… all of these are enabled by our voice synthesis technologies (for use by the 3rd party users of AutoNavi)".

Second, iFlytek tried to identify the **power users** of their applications and convert them into what they called their "fans". The intention of cultivating this fiercely loyal and knowledgeable group of users is to not only lock them into its ecosystem, but through the positive word-of-mouth that they would generate and their advocacy for iFlytek's offerings, the ecosystem could grow even further (Bughin and Hazan 2017). iFlytek's Deputy General Manager (GM) of its Intelligent Education division explained the benefits brought by these "fans": "When planning or upgrading my products, I may engage some of the most proficient and outstanding teachers who are my "fans" to solicit their opinions… They will offer fair and constructive feedback to us which helps in the continuous improvement of my products".

Discussion and Conclusion

While our study is still ongoing, our work to date already hints at a number of important implications for the existing AI literature. First, we specified who the key actors within an AI ecosystem are, which include the core AI firm, external application developers, data sources, domain experts, as well as corporate users of the applications developed and their customers. More importantly, we illustrated the roles that these actors play, the value they generate for one another, as well as their influence on the development of the ecosystem. This corroborates the notion that the development of AI applications requires the integration of technology, domain knowledge and data (Pandya 2019). In other words, it is necessarily a collective endeavor because these resources tend to be owned by different entities (e.g., an AI firm may have the technological capabilities but lack domain knowledge and data), and there is a need to organize these entities into a synergistic ecosystem for this purpose (Tan et al. 2015). When AI application developers and domain experts are appropriately matched, domain-specific AI applications may be developed. When these applications are used, more data may be generated, which will facilitate the refinement of the algorithms of the AI applications. Thus, the efficiency and effectiveness of the AI applications may be continuously improved (Garbuio and Lin 2019). A second theoretical implication is the identification of a specific sequence for the development of an AI ecosystem, which traverses across three stages: (1) Establishing the Core, (2) Attracting and Retaining a Critical Mass of Initial Users, and (3) Fortifying Ecosystem Boundaries. In each of these stages, we explained how each of the stages can be actualized based on actions that can be undertaken by the core AI firm. This complements the existing research on the management of AI and addresses an important knowledge gap that has been neglected in the literature to date. In particular, across the various stages of ecosystem development, we revealed the more salient or influential entities in each

stage, and more importantly, how to recruit and support these entities so that the development of the AI ecosystem is optimized.

Our study is not without its limitations. In particular, our study is based on a single case, and although this is a "typical and legitimate endeavor" in qualitative research (Lee and Baskerville 2003, p. 231), and over half of all case research papers in the field of information systems are based on single cases (Sarker et al. 2012), a common criticism of these studies is the problem of external validity or generalizability (Walsham, 2006). An issue that limits the generalizability of our study, in particular, may lie in its singular context (i.e., a particular AI firm confronted by a specific set of contextual conditions). However, this study invokes the principles of analytic generalization (see Silva and Hirschheim 2007) or what some researchers refer to as "generalizing from description to theory" (Lee and Baskerville 2003, p. 235). In any case, future research can be directed at validating the propositions of our theoretical framework, so that the potential boundary conditions of our framework, such as the extent of government and industry support, national and cultural contexts, and accessibility to technological innovations, can be more clearly delineated. Our future work will be centered on extending and validating our theoretical model with the collection and analysis of additional data from iFlytek, and possibly other successful AI ecosystems. The potential boundary conditions and implications of our model will also be further explored through an ongoing literature review and further data analysis. By collecting and incorporating further data, and subjecting the data to more in-depth analyses, we hope to refine our theoretical model further so that a more holistic understanding of AI ecosystems and applications, as well as their strategic and organizational implications, can emerge.

References

Adams, S., Arel, I., Bach, J., Coop, R., Furlan, R., Goertzel, B., Hall, J. S., Samsonovich, A., Scheutz, M., and Schlesinger, M. 2012. "Mapping the landscape of human-level artificial general intelligence," *AI Magazine* (33:1), pp 25-42.

Barua, A., and Mukherjee, R. 2021. "Multi-homing revisited: Level of adoption and competitive strategies," *MIS Quarterly* (45:2), pp 897-924.

Brynjolfsson, E., and Mcafee, A. 2017. "The business of artificial intelligence," *Harvard Business Review* (available at https://hbr.org/cover-story/2017/07/the-business-of-artificial-intelligence).

Bughin, J., and Hazan, E. 2017. "Five management strategies for getting the most from AI," (available at https://sloanreview.mit.edu/article/five-management-strategies-for-getting-the-most-from-ai/).

Chatterjee, S., Rana, N. P., Dwivedi, Y. K., and Baabdullah, A. M. 2021. "Understanding AI adoption in manufacturing and production firms using an integrated TAM-TOE model," *Technological Forecasting and Social Change* (170), Article 120880.

Chen, H., Chiang, R. H., and Storey, V. C. 2012. "Business Intelligence and Analytics: From Big Data to Big Impact," *MIS Quarterly* (36:4), pp 1165-1188.

Debortoli, S., Müller, O., and vom Brocke, J. 2014. "Comparing business intelligence and big data skills," *Business & Information Systems Engineering* (6:5), pp 289-300.

Eisenhardt, K. M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), pp 532-550.

Eisenhardt, K. M. 1991. "Better Stories and Better Constructs: The Case for Rigor and Comparative Logic," *Academy of Management Review* (16:3), pp 620-627.

Ferlie, E., Fitzgerald, L., Wood, M., and Hawkins, C. 2005. "The nonspread of innovations: The mediating role of professionals," *Academy of Management Journal* (48:1), pp 117-134.

Garbuio, M., and Lin, N. 2019. "Artificial intelligence as a growth engine for health care startups: emerging business models," *California Management Review* (61:2), pp 59-83.

Gartner 2019. "Gartner Survey Shows 37 Percent of Organizations Have Implemented AI in Some Form," (available at https://www.gartner.com/en/newsroom/press-releases/2019-01-21-gartner-survey-shows-37-percent-of-organizations-have).

Gerring, J. 2008. "Case selection for case-study analysis: Qualitative and quantitative techniques," in *The Oxford Handbook of Political Methodology,* J. M. Box-Steffensmeier, H. E. Brady and D. Collier (eds.), Oxford University Press: New York, NY, pp. 645-684.

Gioia, D. A., Corley, K. G., and Hamilton, A. L. 2013. "Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology," *Organizational Research Methods* (16:1), pp 15-31.

Hao, K. 2019. "China has started a grand experiment in AI education. It could reshape how the world learns," *MIT Technology Review* (123:1).

Kiron, D., and Unruh, G. 2018. "How AI Will Define New Industries," *MIT Sloan Management Review* (available at https://sloanreview.mit.edu/article/how-ai-will-define-new-industries/).
Klein, H. K., and Myers, M. D. 1999. "A set of principles for conducting and evaluating interpretive field studies in information systems," *MIS Quarterly* (23:1), pp 67-93.
Langley, A. 1999. "Strategies for Theorizing from Process Data," *Academy of Management Review* (24:4), pp 691-710.
Lee, A. S., and Baskerville, R. L. 2003. "Generalizing generalizability in information systems research," *Information Systems Research* (14:3), pp 221-243.
Li, J., Li, M., Wang, X., and Thatcher, J. B. 2021. "Strategic directions for AI: The role of CIOs and boards of directors," *MIS Quarterly* (45:3), pp 1603-1643.
Moreno, J. 2021. "Google Dismantling Health Division," (available at https://www.forbes.com/sites/johanmoreno/2021/08/21/google-dismantling-health-division/).
Myers, M. D., and Newman, M. 2007. "The Qualitative Interview in IS Research: Examining the Craft," *Information and Organization* (17:1), pp 2-26.
Pan, S. L., and Tan, B. 2011. "Demystifying Case Research: A Structured–pragmatic–situational (SPS) Approach to Conducting Case Studies," *Information and Organization* (21:3), pp 161-176.
Pandya, J. 2019. "How artificial intelligence is transforming business models," *Forbes* (available at https://www.forbes.com/sites/cognitiveworld/2019/07/10/how-artificial-intelligence-is-transforming-business-models/#3f8329cf2648).
Quan, X. I., and Sanderson, J. 2018. "Understanding the artificial intelligence business ecosystem," *IEEE Engineering Management Review* (46:4), pp 22-25.
Rai, A., Constantinides, P., and Sarker, S. 2019. "Editor's comments: Next-generation digital platforms: toward human–AI hybrid," *MIS Quarterly* (43:1), pp 3-9.
Ransbotham, S. 2018. "Get the most out of AI today," *MIT Sloan Management Review* (available at https://sloanreview.mit.edu/article/get-the-most-out-of-ai-today/).
Reim, W., Åström, J., and Eriksson, O. 2020. "Implementation of artificial intelligence (AI): A roadmap for business model innovation," *AI* (1:2), pp 180-191.
Reis, L., Maier, C., Mattke, J., Creutzenberg, M., and Weitzel, T. 2020. "Addressing User Resistance Would Have Prevented a Healthcare AI Project Failure," *MIS Quarterly Executive* (19:4), Article 8.
Ryder, A. 2019. "Three steps to implement AI," (available at https://sloanreview.mit.edu/article/three-steps-to-implement-ai/).
Sarker, S., Xiao, X., and Beaulieu, T. 2012. "Towards an anatomy of "successful" qualitative research manuscripts in IS: A critical review and some recommendations," *ICIS 2012 Proceedings* (available at http://aisel.aisnet.org/icis2012/proceedings/ResearchMethods/12/).
Siggelkow, N. 2007. "Persuasion with case studies," *Academy of Management Journal* (50:1), pp 20-24.
Silva, L., and Hirschheim, R. 2007. "Fighting against windmills: Strategic information systems and organizational deep structures," *MIS Quarterly* (31:2), pp 327-354.
Sipior, J. C. 2020. "Considerations for development and use of AI in response to COVID-19," *International Journal of Information Management* (55), Article 102170.
Tan, B., Pan, S. L., Lu, X., and Huang, L. 2009. "Leveraging digital business ecosystems for enterprise agility: The tri-logic development strategy of Alibaba. com," (available at https://aisel.aisnet.org/icis2009/171/).
Tan, B., Pan, S. L., Lu, X., and Huang, L. 2015. "The role of IS capabilities in the development of multi-sided platforms: The digital ecosystem strategy of Alibaba.com," *Journal of the Association for Information Systems* (16:4), pp 248-280.
Tarafdar, M., Beath, C. M., and Ross, J. W. 2019. "Using AI to enhance business operations," (available at https://sloanreview.mit.edu/article/using-ai-to-enhance-business-operations/).
Urquhart, C. 2001. "An encounter with grounded theory: Tackling the practical and philosophical issues," in *Qualitative Research in IS: Issues and Trends,* E. Trauth (ed.), Idea Group Publishing: Hershey, PA, pp. 104-140.
van Maanen, J. 1979. "The fact of fiction in organizational ethnography," *Administrative Science Quarterly* (24:4), pp 539-550.
Walsham, G. 2006. "Doing interpretive research," *European Journal of Information Systems* (15:3), pp 320-330.
Zhu, L. 2019. "iFlytek Delivers on Promise to Become Major Player," *China Daily* (available at http://www.chinadaily.com.cn/a/201902/19/WS5c6b5f9ba3106c65c34ea0c3.html).