

Investigating the Impact of Recommendation Agents on E-commerce Ecosystem

Emergent Research Forum Paper

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Abstract

The influence of recommendation agents on e-commerce ecosystem is profound. Technological impact of predictive intelligence could be explained more reasonably by taking a collective perspective. However, the ecosystem perspective has only served as a prologue for discussion regarding technological influence. The lack of research development associated with the technological influence on business in the ecological lens has constrained our understanding of the penetration and the role of technology in business ecosystem evolution. This paper therefore focuses on the impact of recommendation agents for online shopping environment on e-commerce ecosystem. Moreover, this paper observes and explains the phenomena that most participants in the e-commerce ecosystem are taking recommendation agents as one of the strategic technological investments towards further development as a common goal.

Keywords

Recommendation agents (RAs), information technology (IT), e-commerce ecosystem, adaptation

Introduction

Nowadays, with the fast development of informatization and globalization, information technology (IT) has been increasingly significant in business activities. Firms, business network (Gulati 1998) and business ecosystems (Moore 1993) are either embracing the change or forced to deal with the significance of IT. Due to the tightening relationships among firms and organizations, accumulative technological impact should be explained and analyzed better by taking a more collective perspective. Thus, the business ecosystem perspective is introduced and established. Nokia, for instance, can be viewed as a business ecosystem, covering several industries, also co-existing with other participants such as complementary providers and suppliers in order to achieve common goal for mutual benefit. When the first smartphone operation system struck the market, the failure to react properly would lead to the doom of the whole ecosystem survival, in this case, Nokia itself and its associated ecosystem including Symbian and relevant participants. It is obvious that the influence of IT on business ecosystem is profound.

As one type of business ecosystems, e-commerce ecosystem focuses on online retailing and business trading. This particular ecosystem emerged from traditional offline trading environment decades ago. Nowadays e-commerce ecosystem is relying on IT as its indispensable element. Thus, the technological impact on e-commerce ecosystem could be strategically fundamental.

Recommendation Agents (RAs) as an obvious application for predictive IT have now been widely considered as one of the major technological emphasis on e-commerce development (Gretzel and Fesenmaier 2006; Xiao and Benbasat 2007). One example of RAs is Amazon's cross-selling recommendations. In response to the growth of RAs, current e-commerce ecosystem may adapt to a new strategic goal for development in order to adjust to a more intelligent online trading environment.

Therefore, in this paper, we argue that RAs as one of the external technological turbulences would affect e-commerce ecosystem and force the ecosystem to take adaptation mechanisms (Anderson 1999; Jones et

al. 1997) to shift the common goal for the better development. In another word, this emergent research forum (ERF) paper attempts to investigate whether most of the companies in the e-commerce ecosystem are actually using RAs as an interactive tool; and if they are, what is the strategy they take for development toward such tools; and if they are not, what are the influences on performance on firms who use RAs and those who do not. Thus, several research questions will be addressed in this ERF paper:

- 1) *What is e-commerce ecosystem?*
- 2) *What strategic mechanisms does the whole e-commerce ecosystem take in respond to technological impact of recommendation agents?*

Following this introduction, we will explore the concepts of e-commerce ecosystem and recommendation agents. Then we discuss the adaptation mechanism of ecosystem survival, followed by the proposed data collection and analysis. We also offer final implications and conclusions in this ERF paper.

E-commerce ecosystem

Given that the exploding markets and complex technologies ask for more connections from fresh participants inside the business web, organizations and companies should be aware of the effective relationship utilization with consumers, collaborators and competitors (Albert-Laszlo 2002). However, only when such business models, influential factors and relative mechanisms, which govern such networks, have been fully understood, will the organizations and companies achieve better business performance. Therefore, the business ecosystem perspective is needed to account for phenomena regarding strategic common goal that cannot be sufficiently explained by network perspective.

The concept of business ecosystem was first introduced in 1993. Moore (1993) suggested replacing the term industry with business ecosystem because economic activities nowadays are not under specific industries, due to the fast development of globalization and technologies. Furthermore, business ecosystem has been defined as an organism of the business world, facilitated by individual organization and the interactions among them (Anderson 1999; Iansiti and Levien 2004; Peltoniemi and Vuori 2004; Ritter and Gemünden 2003). Since business ecosystem can only be formed once there exists a long-term goal, it will take time for researchers and practitioners to realize the significance of ecosystem perspective.

The perspective of business ecosystem emphasizes the strategies that could maintain the performance and health of participants and business network. Moreover, it recognizes three significance aspects (see Figure 1), namely **participants**, **networks** and **governance**. Ecosystem *participants* can be roughly divided into two kinds based on the scale (Graça and Camarinha-Matos 2016; Hartigh and Asseldonk 2004; Iansiti and Levien 2004). A small-scale e-commerce ecosystem can be a multinational corporation company with subsidiaries, such as eBay with EachNet, Marktplaats and the rest subsidiaries. Ecosystem *network* is where the participants are embedded, such as collaboration and competition (Adner and Kapoor 2010; Camarinha-Matos and Afsarmanesh 2008; Gulati 1998; Hartigh and Asseldonk 2004). Ecosystem *governance* refers to the activities of enhancing planning capacities, decision making, monitoring and facilitating change processes involving multiple stakeholders in the ever-changing system and institutional environment without an absolute participant setting unchangeable rules or regulations (Corallo et al. 2007; Hartigh and Asseldonk 2004; Jones et al. 1997; Ritter and Gemünden 2003).

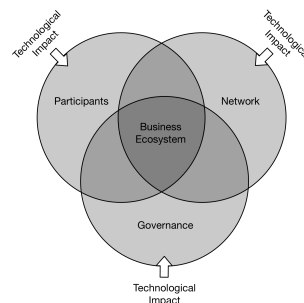


Figure 1. The Proposed Structural Model of Technological Impact on Business Ecosystem

Taking analogies from biology (Foster 1997; Hannon 1997; Jansen et al. 2009; Mitleton-Kelly 2003; Rothschild 1990), business ecosystem is defined in this study as: “a structured, reticular business system with participants in it, sharing a common fate by simultaneous symbiosis” (Figure 1). Reticular as a biological term is used to emphasize the growing nature of ecosystem. Also symbiosis refers to organic combination of cooperation and competition, aiming for the goal of survival.

E-commerce ecosystem is one kind of business ecosystems, which includes online retailing facilitated by information technology and Internet. There is no strict geographical limitation when it comes to global market in e-commerce and therefore, participants within the e-commerce ecosystem are strongly connected with each other. Similar to biological ecosystems where a forest and a giant tree can be both considered as ecosystems. When considering particular problems, different scaled ecosystems should be chosen properly. In this ERF paper, in order to provide a straightforward illustration of the technological impact on strategic goals, we chose a relatively small-scale e-commerce ecosystem. Within a clear strategy roadmap, the analysis of this small-scale e-commerce ecosystem will be reflected more convincingly.

Recommendation agents (RAs)

Online marketplaces provide customers with a large amount of product information. In order to help customers to smooth decision-making process, e-commerce companies have developed RAs to assist purchase process. Well-designed RAs have already influenced customers’ perception toward information process and predictive intelligence interaction.

RAs can observe, learn and predict customers’ shopping preferences and patterns, recommending relevant alternatives and complementary items. Furthermore, as decision support system, RAs provide information process assistance, reducing the effort from customers’ side and simplifying the decision making process. Thus, RAs have the potential to improve customers’ experience by reducing information overload and search complexity (Häubl and Trifts 2000). Also, as predictive intelligence, RAs remove the need for human participation in time consuming or complex tasks, optimizing customer-shopping experience and affecting customers’ purchase behavior (Xiao and Benbasat 2007). Additionally, some RAs can even compare the same product from different suppliers and recommend alternatives when one product is out of stock. These RAs organically relocate resources within the e-commerce ecosystem, accelerating the process of network optimization (Qiu and Benbasat 2010).

Services are emerging based on artificial intelligence that provides solutions based continual learning and understanding user intent. Machine learning and cognitive intelligence services allow RAs to predict requests instantly, simplify interactions and offer enhanced experiences. First, RAs will impact on the *participant* aspect of the e-commerce ecosystem in particularly customer purchase pattern and influence the profit and revenue (Benbasat and Wang 2005). Second, RAs will impact on customer shopping experience and influence customer relationship and loyalty (Benbasat and Wang 2005). Third, RAs will impact on e-commerce network resource relocation and therefore optimizing the dynamic structure of the *network* (Qiu and Benbasat 2010). It is obvious that RAs should be considered as a significant strategic investment and development for e-commerce. Therefore, in order to cope with RA innovation and to gain competitive advantage, e-commerce ecosystem should take survival mechanism such as adaptation mechanism from a *governance aspect*, setting a strategic common goal for technological investment and development. Thus, we argue that by taking RAs as one of the major technological strategic common goal for e-commerce ecosystem, the adaptation of ecosystem in response to such IT will consequently cultivate and nourish an environment for long-term symbiosis and better performance.

Adaptation mechanism

Business ecosystem, when considered to be a complex system, is a system of co-evolution, symbiotic and self-reinforcement. It focuses on the development of innovation brought in by participants or the community under community governance and mechanism, aligning with a common vision of a desired future and a shared roadmap (Iansiti and Levien 2004; Lengnick-Hall and Wolff 1999; Moore 1996).

In a health and long lasting ecosystem, participants are more concerned about the fate of the ecosystem itself. Participants share a higher common goal of achieving better performance all together as an organic system and surviving together to fight against whatever may sabotage the very existence of the ecosystem

they are in. Whenever there is turbulence, a biological ecosystem will adapt to fit the environment. The same goes to an e-commerce ecosystem. In response to the development of RAs, the whole e-commerce ecosystem can manage to adapt and perform better. Based on the complexity theory (Lengnick-Hall and Wolff 1999), ecosystem takes adaptation mechanism to cultivate and nourish an environment for a long-term symbiosis and better performance (Mitleton-Kelly 2003).

Take e-commerce ecosystem eBay as an example. For strategic roadmap and blueprint, eBay takes merger and acquisition as the method to expand its ecosystem into different countries and regions. Therefore, the parent company eBay and every subsidiary within the ecosystem more or less stick to the same strategic development (eBay annual report 2015). As one of the largest e-commerce ecosystems in the world, eBay ecosystem shares a common goal, offering guidance, incentives, motivations and visions to participants. In this paper, we argue that e-commerce ecosystem takes the adaptation mechanism to improve the capability to deal with internal growth and technological impact brought by RAs (Figure 2).

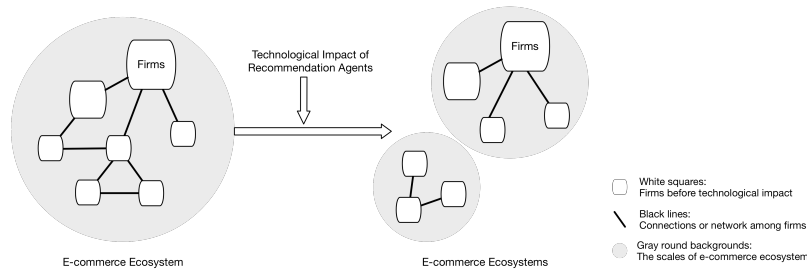


Figure 2. The Proposed Technological Impact on Strategic Common Goal

Figure 2 shows an e-commerce ecosystem can evolve under the technological impact of RAs. The left hand is the previous e-commerce ecosystem without RAs and it splits up into two ecosystems after the introduction/improvement of RAs. The upper bigger ecosystem on the right hand side could be the new e-commerce ecosystem taking RAs as a strategy for the development of the whole ecosystem including subsidiaries. The lower smaller one may be adapted to the new one eventually.

Proposed research method – A case study on eBay ecosystem

Due to the limited available research studies, unfortunately, we can't draw an effective summary or a conclusion of the potential adaption mechanisms of e-commerce ecosystem. In order to explore the phenomenon where technological impact of RAs on e-commerce ecosystem adaptation with a new strategic common goal, we attempt to make use of case studies to elicit the utilization of RAs in real-life e-commerce ecosystem to conceptualize the adaptation mechanisms. We chose eBay as the target ecosystem, since eBay takes merger and acquisition (M&A) strategies when the ecosystem expands. It is clearer to observe the common strategic goal for eBay ecosystem because where RA impact on the whole ecosystem for the common goal can be reflected directly on subsidiaries. Furthermore, one of the authors in this research project works at eBay. His contacts at eBay can provide the opportunity to access various sets of objective and subjective data at different levels such as survey and interviews. In addition to exploratory case study, we will spread out surveys to employees, competitors if possible, suppliers and customers to answer the research questions. Experts will be invited to interviews to discuss the concept of e-commerce ecosystem. Interviews will help further hammer the trend of utilizing e-commerce ecosystem perspective as an approach to evaluate business activities and technology development.

Discussions and implications

The technological landscape is constantly changing the state of development. Organizations are desperately hoping to gain competitive advantages in business with the help of technologies for success. Therefore, appropriate investment and development on RAs, or the technology such as predictive intelligence in general could enhance e-commerce financial performance and strategy alteration. Our project aims to provide rich insight on making investment or strategic decisions when facing the development of RAs in the context of e-commerce ecosystem adaptation. If a firm wants to hold a position in the competition, the firm should analyze the impact of RAs on e-commerce ecosystem from the aspects

of participants, governance and network, and should also be aware of the situation the firm in. It is significant to understand the value of RAs at ecosystem level for both scholarly and practical implications.

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