# THE STUDY OF TYPOLOGY OF COMPETITIVE ACTIONS IN DIGITAL ENVIRONMENT: AN EMPIRICAL INVESTIGATION OF MOBILE INSTANT MESSAGING

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## Abstract

*The highly competitive and increasingly transparent characteristics of the digital environment have led inter-firm rivalry more frequently. Competitive actions and competitor's responses together determine firms' value creation. The key to obtain competitive advantages is to stop or delay competitor's response. Therefore, our research question is which type of actions is the most effective in digital environment. Grounded in the framework of explorative/exploitative in the organizational learning literature, we organize competitive actions from two dimensions: resources based (strategic versus tactical) and innovation based (innovative versus efficient). This paper studies the competitive actions in mobile instant messaging industry and use structured content analysis to capture firms' competitive actions. Finally, 113 matched competitive actions and responses were collected. Then, we compare the effects of different types of competitive actions from three aspects, that is the number of responses, response time and response quality. The results show that innovative-strategic action is the most effective action in digital environment. Our action-level study of MIM (mobile instant messaging) promotes better understanding of how firms interact with each other in digital environment. Moreover, the new typology of competitive action helps us identify competitive actions in digital environment more precisely and help managers to better understand industry dynamics thus developing appropriate strategies to compete in the industry.*

*Keywords: digital environment, mobile instant messaging, types of competitive actions, competitive interaction, structured content analysis*

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# 1    INTRODUCTION

Digital environment is characterized by web 2.0, cloud computing and other digital technology (Yoo et al. 2010) that accelerates the speed of digital innovation in turn. However, open architectures, web services, and modular technologies, combined with reverse engineering and rapid deployment of applications (Grover & Kohli, 2013), make it increasingly easier and quicker for competitors to imitate better products. In order to obtain competitive advantages, firms have competed vigorously in digital environment. It's the competitive action and competitors' response together that determine focal firm's value creation (Chen & Miller 2012). So firms can thrive on uncertainty they create for their competitors (Mithas et al., 2012). Moreover, we find that some types of competitive actions that focal firm implemented can minimize and delay competitors' responses while others can't. For example, when Alibaba first proposed the product of Internet finance, Yuebao, it takes a long time for other firms to react. Therefore, our research question is whether the effects of actions have significant difference between different types of competitive actions and which type of competitive action can reduce number of responses and delay competitors' responses in digital environment.

The competitive dynamics literature has conceptualized different types of competitive actions and studied their antecedents and consequences (Chen & Hambrick 1995; Ferrier et al. 1999; Katila & Chen 2008). For instance, researchers have studied pricing, marketing, new products, capacity/scale (e.g., Smith et al., 2001) as well as R&D moves and actions to structure, bundle, and leverage resources in product and regulatory arenas (Bridoux et al. 2013) in varied empirical contexts from airlines (Miller & Chen 1996) to shipbuilding (Audia & Greve 2006), and Fortune 500 firms (Ferrier 2001). Overall, these various types of competitive actions can be organized into the broad dichotomy of "strategic" versus "tactical" in competitive dynamics literature (Chen et al. 1992). On the one hand, prior research on strategic management has examined the type of competitive actions in more traditional industries such as the airline, shipbuilding industries. Indeed, authors have encouraged research on competitive actions in new or nascent markets (Smith et al. 2001). On the other hand, the dichotomy of "strategic" versus "tactical" of competitive actions maybe not accurate under the digital dynamic competitive context which is characterized by innovation.

Following the study of competitive actions in strategy management IS researchers have paid more attention on competitive dynamics in digital environment and how IT impacts firm's competitive actions. Information System Research, top journal of IS, published a special issue named "Digital Systems and Competition" in 2010, discussed about the following topics: (1) the impacts of digital systems on competitive actions and competitive dynamics, (2) digital systems and the changing forms of competition and collaboration, and (3) competition in digital markets (Ferrier et al. 2010). The first topic articulates the impact of IT over competitive actions (Joshi 2010; Chi et al. 2010). Besides, Sambamurthy (2003) has suggested that information technology (IT) and systems might help firms undertake competitive actions of greater volume and complexity. The second topic applies competitive dynamics lens into IT value creation study (Rai & Tang 2010; Pavlou 2010). And the last topic studies competitive dynamics in digital market, e.g. SNS, Software industry (Gnyawali et al. 2010; Li et al. 2010). However, despite the fact that research on IS has recognized the importance of competitive actions in IS- and IT-driven industries, most of them studies the competitive dynamics in the business-level examining patterns of competitive actions (e.g., action repertoire or a series of actions). Empirical IS research has not examined particular types of competitive actions and their corresponding effects in action-level (e.g. the number and speed of responses etc.), which is directly related to firm performance.

The purpose of this paper is to find a new typology of competitive actions and their corresponding effects in digital environment. Based on explorative/exploitative in organizational learning literature, a research framework is developed to classify competitive actions into two dimensions: resource based (tactical versus strategic) and innovation based (innovative versus efficient). In line with prior research in competitive dynamics, we use structured content analysis to capture the competitive actions of

WeChat, EasyChat and Laiwang, three main mobile instant messaging competitors in China and coded competitive actions of MIM industry based on published news reports. Finally, we inspect the competitive interaction by pairing competitive actions and responses and compare the effects of different types of competitive actions from three aspects, that is the number of responses, response time and response quality. The results show that innovative-strategic action can mostly delay response timing and reduce response quality but it can't reduce number of responses. It's consistent with the hyper competitive status quo of digital environment. Firms need to implement various competitive actions and react quickly to emerging opportunities to obtain temporary competitive advantage.

The remainder of the paper is organized as follows. In the second section, we first propose a new typology of competitive action in digital environment and based on research framework, propose hypotheses. The third section is composed of detailed introduction of sample and data collection. And the fourth section presents the statistical analyses and results. Finally, we put forward further discussion and implications about our research in the fifth section.

## 2 THEORY AND HYPOTHESIS

In this section, considering the characteristic of digital environment, we first propose a new typology of competitive actions in digital environment grounded in the framework of explorative/exploitative in the organizational learning literature. Next, we compare the effects of different types of competitive actions based on our research framework and propose our hypotheses.

### 2.1 Type of Competitive Action

Prior research in strategic management has organized various types of competitive action into the broad dichotomy of "strategic" versus "tactical" (Porter 1980; Chen et al. 1992). This kind of typology is based on resource view. They attach much importance to resource commitment and contend that action with high commitment of resources is strategic action. Otherwise it's tactical action.

However, digital environment is characterized by digital innovation. Specifically, the 50-year march of Moore's Law has witnessed the relatively cheap and increasingly easy-to-use worldwide digital infrastructure, such as computers, mobile devices and advanced application platforms (Fichman et al. 2014). This digital infrastructure has, in turn, accelerated the emergence of new technologies that change the way we live and work. Moreover, the continuous emergence of new digital technology has triggered various digital innovations. In result, this creates positive network externalities that further accelerate the creation and availability of digital devices and digital technology. Digital technology, therefore, has democratized innovation and almost everyone can participate (Yoo et al., 2010). So one of the remarkable characteristics of digital environment is innovation. Apparently, prior typology of competitive actions could no longer reflect this characteristic.

Research of competitive dynamics in IS also stresses the importance of innovative actions in IS- and IT driven industry. Gnyawali et al. (2010) find that product innovation accounts for 34% of all competitive actions of SNS firms. Besides, in the study of software industry, Li et al. (2010) aggregate the various types of moves into two basic types of competitive actions: innovation related and resource related. Moreover, scholars of IS have recognized that new digital technology (like web 2.0, cloud computing et al.) and popularity of digital infrastructure have made firms to think more about innovation rather than resources based action (Yoo et al. 2010; Grover & Kohli, 2013). Therefore, it's not appropriate to just distinguish competitive action from resource view in digital environment. Based on the typology of competitive actions in competitive dynamics literature (Porter 1980; Chen et al. 1992) and the framework of explorative/exploitative in the organizational learning literature (March 1991; Benner & Tushman 2003; Ling et al. 2012), we classify actions in digital environment from two dimensions: innovation based and resources based.

We contend that innovation is closely related to exploration in organizational learning. In order to obtain temporary competitive advantages and adjust to fast-changing digital environment, firms are

required to place themselves in discovering new possibilities and learning new knowledge. In short, it's a matter of exploration of new possibilities in organizational learning (March 1991). Innovative action involves in searching for new knowledge and opportunities to provide new product or service for emergent market. Besides, there also exists exploitation of old certainties in organizational learning, which is targeted at improving organizational efficiency. Accordingly, the theoretical basis for the typology is grounded in the framework of explorative/exploitative in the organizational learning literature. March (1991) contend that exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, and execution. So, based on the framework of explorative/exploitative in the organizational learning, competitive actions can also be organized into broad dichotomy of "innovative" and "efficient" in digital environment.

In particular, *innovative action* refers to firms search for new knowledge, develop new products and services for emerging customers and markets, while *efficient action* refers to firms use their existing knowledge to enhance organizational efficiency (Benner & Tushman 2003; Ling et al. 2012).

Concerned about resources, in line with prior research in strategic management, we contend that *strategic action* generally involves a more significant commitment of resources—especially investment in fixed assets, major reorientation or realignment of the organization-environment relationship, major change in the definition of the business, reconfiguration of organizational structure, and radical changes. In contrast, *tactical action* requires relatively minor, routine changes resolvable by middle- or low-level managers. Fewer resources are committed, and procedural modification can generally be substituted for structural reformation (Chen et al. 1992). Figure 1 depicts a new typology of competitive actions in digital environment.
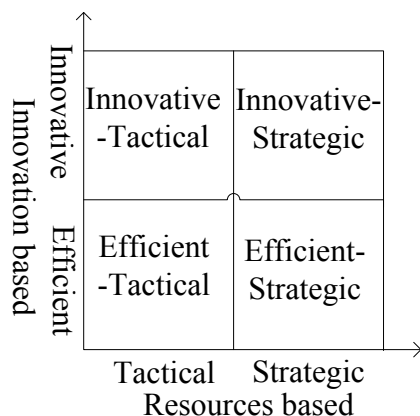


*Figure 1.*　　　*Type of competitive action in digital environment*

As shown in Figure 1, *efficient-strategic action* refers to firms use extant knowledge with significant commitment of resources to implement an action. For example, WeChat entries into international markets. *Efficient-tactical action* is relatively minor, routine changes and procedural modification based on extant knowledge, e.g., in order to attract users, Easychat offers free stickers in reaction to charged stickers of WeChat. And *innovative-tactical action* refers to firms utilize new knowledge with few commitment of resources to implement an action, e g. after providing new product to new market and potential customers, firms' follow-up actions like software upgrading. *Innovative-strategic action* refers to firm input significant commitment of resources while using new knowledge to develop innovative actions usually coming up with devastating innovation. Amazon's Kindle is a perfect example of this kind of action.

## 2.2  Effects of Competitive Action

Competitive dynamics emphasizes that competitive action and response is dyadic (Chen & Miller 2012). So on the action-level, characteristics of response can measure the effects of a certain action. From an initiator's point of view, if an action can minimize the total number of competitive responses and delay the responses, a competitive advantage may be more sustainable (Chen et al. 1992; Chen & Miller 1994; Chen & MacMillan 1992). Besides, considering the hyper-competitive characteristics of digital environment and rapid imitation of products or services, based on competitive impact that Chen et al. (1992) proposed, we propose response quality to better measure the effects of competitive action.

*Number of Responses*

According to Chen et al. (1992), we define the number of responses as the total number of actual responding competitive responses. The initiating firm's profit may be adversely affected if its action triggers intense counteractions from a large number of competitors, thus it would be hard for initiating firm to continuously enjoy its monopolistic.

*Response Timing*

According to Chen et al. (1992), we define the response timing as a period during which initiator monopolizes the market and reaps the economic benefits of an action, provided the action is effective. Accordingly, an initiator prefers to undertake actions that maximize response lag. Empirically, Boyd and Bresser (2008) have proved a positive linear relationship between response delay and first mover performance. In a word, the longer of the response timing, the better of the initiator's performance is.

*Response Quality*

According to Chen et al. (1992), competitive impact can reflect the pervasiveness of an action's effect on competitors. If the competitor responds an action with high quality, it can cause great impact to focal firm thus causing immensely impact on focal firm's monopolistic market. Otherwise, focal firm can also be able to sustain most of its competitive advantage.

## 2.3  Research framework

From the standpoint of decision tree theory, the research framework is proposed to compare different types of competitive actions. And it's composed of two parts. The first part is choosing a certain type of competitive action. We first organize competitive action from innovation-based perspective and classify competitive action into innovative action and efficient action. Then, from resources based, innovative action and efficient action can be further aggregated into innovative-tactical, innovative-strategic and efficient-tactical and efficient-strategic action. This thought is well mapped in practice. In digital environment, even the minor enhancement in extant product can immensely improve user experience, which is the key element of performance in digital environment. Thus, regardless of the commitment of resources, what firms considers more is whether they need to learn new knowledge to develop new offerings or simply use extant knowledge to improve existing ones. So in digital environment, we contend that when firms experiment actions the first thing they consider is innovation based not resource based. It's a choice of contributing to novel product or enhancing its organizational efficiency.
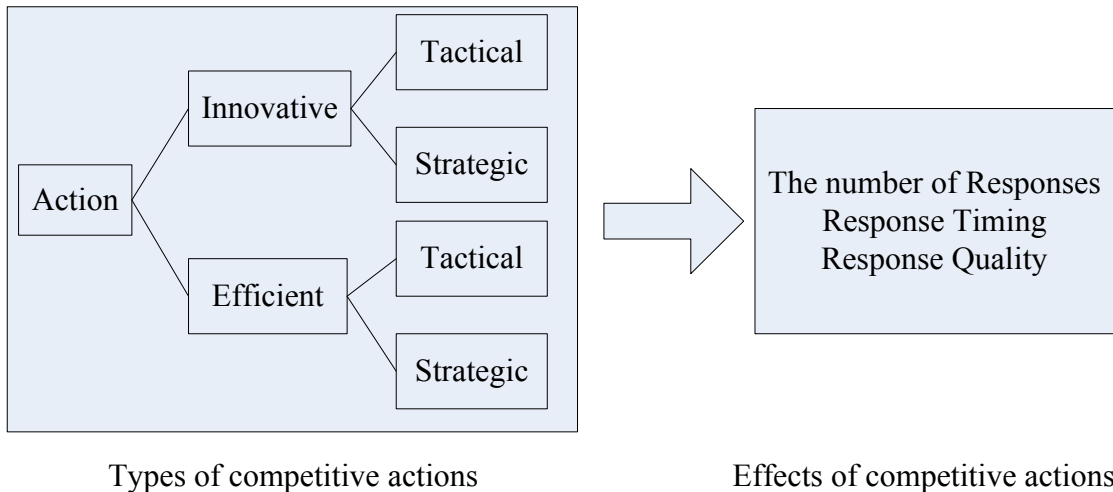
Types of competitive actions                          Effects of competitive actions

*Figure 2.        Research Framework*

The second part is using characteristics of competitive responses to measure the effects of competitive action. Our argument of this part is based on AMC framework that Chen (1996) proposed to predict competitors' response. Chen emphasizes that competitors can offer responses to a competitive move (i.e.. a stimulus) only if they are aware of the move, if they are motivated to respond to the move, and if they are capable of responding to the move. Competitor wouldn't response a competitive action unless those conditions are all satisfied. Here, we propose number of responses, response timing and response quality to measure the effects of competitive action.

*2.3.1    Innovative action versus Efficient action*

Innovative action refers to firms search for new knowledge, develop new products and services for emerging customers and markets, while efficient action refers to firms use their existing knowledge to enhance organizational efficiency (Benner & Tushman 2003; Ling et al. 2012).

Reed and DeFillippi (1990) argue that tacitness, complexity, and specificity in a firm's skills and resources can generate causal ambiguity in competency-based advantage, and thus raise barriers to imitation. Tacitness refers to the implicit and noncodifiable accumulation of skills that results from learning by doing. Complexity results from having a large number of interdependent skills and assets. Specificity refers to the transaction-specific skills and assets that are utilized in the production processes and provision of services for particular customers (Reed & DeFillippi 1990).

On the one hand, efficient action refers to firms use their existing knowledge to enhance organizational efficiency usually involving in refinement of products or services and performing existing activities more efficiently. Neither acquiring new knowledge nor skills by learning nor transaction-specific skills and assets are needed when implementing efficient actions. So there is a low level of tacitness, complexity and specificity, which results in low causal ambiguity and barriers to imitation that can arouse competitors' imitation and responses in a short time. Accordingly, we argue that efficient action and innovative action has significant difference in *response timing*. On the other hand, innovative action refers to firms search for new knowledge; develop new products and services for emerging customers and markets. Firms need a large number of interdependent skills and assets, even learn by doing when implementing innovative actions. So there is a high level of tacitness and complexity, which results in high causal ambiguity and barriers to imitation that can increase difficulty to response. Moreover, implicit skills and assets are needed when experimenting innovative actions, competitors couldn't respond with high quality. Therefore, we contend that efficient action and innovative action has significant difference in *number of responses* and *response quality*. The phenomenal success of Amazon's Kindle exemplifies our argument.

*Hypothesis 1. The effects of action have significant difference between efficient action and innovative action in digital environment.*

*Hypothesis 1a. The number of responses has significant difference between efficient action and innovative action in digital environment.*

*Hypothesis 1b. The response timing has significant difference between efficient action and innovative action in digital environment.*

*Hypothesis 1c. The response quality has significant difference between efficient action and innovative action in digital environment.*

### 2.3.2    Efficient-tactical action versus Efficient-strategic action

Efficient-strategic action refers to firms use extant knowledge with significant commitment of resources to implement an action. Efficient-tactical action is relatively minor, routine changes and procedural modification based on extant knowledge.

Above all, compared to efficient-tactical action, efficient-strategic action requires a long time of resources reorientation and structural reformation (Chen et al. 1992). It will take competitors a long period of time to understand the mechanism of implementing such action. Therefore, there is a significant difference in *response timing* between efficient-tactical action and efficient-strategic action. Moreover, responses to efficient-strategic action will be fewer, because of the difficulty in reallocating resources, and in implementing a major strategic reorientation and structural reformation. In contrast, competitors will be more familiar with the implications of an efficient-tactical action and will likely have experience on which to base a response decision. The low level of barriers to imitation results in competitors responding with high quality. Accordingly, we argue that efficient-tactical action and efficient-strategic action has significant difference in *number of responses* and *response quality*.

*Hypothesis 2. The effects of action have significant difference between efficient-tactical action and efficient-strategic action in digital environment.*

*Hypothesis 2a. The number of responses has significant difference between efficient-tactical action and efficient-strategic action in digital environment.*

*Hypothesis 2b. The response timing has significant difference between efficient-tactical action and efficient-strategic action in digital environment.*

*Hypothesis 2c. The response quality has significant difference between efficient-tactical action and efficient-strategic action in digital environment.*

### 2.3.3    Innovative-tactical action versus Innovative-strategic action

Innovative-tactical action refers to firms utilize new knowledge with few commitment of resources to implement an action, e g. after providing new product to new market and potential customers, firms' follow-up actions like software upgrading. Innovative-strategic action refers to firm's input significant commitment of resources while using new knowledge to develop innovative actions usually coming up with devastating innovation.

Owing to innovative-strategic action usually brings to novel products or services, the effectiveness of innovative-strategic actions often remains uncertain for a long period of time. Consequently, competitors may be less motivated to respond until the uncertainty is removed. Therefore, responses to innovative-strategic action is slower and fewer. Moreover, there is a high level of tacitness, complexity, and specificity, which results in barriers to imitation, thus competitors are unable to respond with high quality in a short time. From this, we argue that innovative-tactical action and innovative-strategic action has significant difference in number of responses, response timing and response quality.

*Hypothesis 3. The effects of action have significant difference between innovative-tactical action and innovative-strategic action in digital environment.*

*Hypothesis 3a. The number of responses has significant difference between innovative-tactical action and innovative-strategic action in digital environment.*

*Hypothesis 3b. The response timing has significant difference between innovative-tactical action and innovative-strategic action in digital environment.*

*Hypothesis 3c. The response quality has significant difference between innovative-tactical action and innovative-strategic action in digital environment.*

# 3 METHODS

Consistent with prior research in competitive dynamics (Smith et al. 2001), we used structured content analysis to capture the competitive actions of mobile instant messaging. And then based on our coding scheme, two independent researchers code the full content of the article and match actions and responses. Finally we got 113 validated samples and test our hypotheses using T-test for independent samples.

## 3.1 Data Collection

Our empirical investigation focuses on the MIM industry because of its uniqueness and the growing popularity of MIM in China. Mobile instant messaging (MIM) is defined as a presence enabled messaging service that aims to transpose the Internet desktop messaging such as QQ or MSN experience to the usage scenario of being connected via a mobile/cellular device. Unlike many previous computer-based instant messaging, MIM is primarily mobile based and provides means of text chat, voice, video, moments, games, public accounts and even mobile payments. It's definitely a new product of digital technology. Besides the industry has a tremendous impact on our lives. Taking WeChat for example, according to Tencent's financial statement in the first quarter of 2014, it has more than 396 million active users and it has become the most popular MIM in China.

Mobile Internet has been more and more popular, a lot of Internet firms has realized the importance of the access of mobile Internet especially MIM which can help them create a closed loop of their ecosystem. Tencent released WeChat at January 21$^{st}$ 2011 and now it has more than 600 million users. Alibaba, a traditional B2C firm, have experimented various ways to generalize its MIM product, Laiwang, and attract users. And the same dose NetEase, it has published its MIM product, EasyChat, cooperating with China Telecom in August 19$^{st}$ 2013 and also competed vigorously to attract and maintain users. Moreover, MIM firms can easily get carried away by the efficiency and low cost of modular and flexible building blocks of digitization (Grover & Kohli 2013). So this two elements together result in today's competitive situation of MIM in China. They have implemented various competitive actions ranging from product innovation to advertising. Even though the time window is short, we can still get enough samples. So MIM is a proper industry for us to study the types of competitive actions and its effects in digital environment. And because of their popularity and tremendous impacts of our life, MIM firms and their competitive actions are often noticed and reported in the news media which is the access for us to capture competitive actions.

## 3.2 Competitive Action Data

Consistent with the methodology used extensively in competitive dynamics research, we employed structured content analysis of press articles. This method comprises techniques for reducing qualitative text to a unit-by-variable matrix and enables researchers to quantitatively test hypotheses (Jauch et al. 1980). Identifying competitive actions and responses is a major challenge in competitive dynamics research (Chen et al.1992), and our approach uses consistent steps and procedures to proceed with the utmost caution.

First, we searched all published news articles and announcements about competitive actions using portal tech site like tech 163 (http://tech.163.com/) et al., professional site like Ebrun (http://www.ebrun.com/) which covers all externally directed and market based competitive actions of WeChat, Easychat and Laiwang. From the universe of news items in the above two resources, we applied the following search criteria within the search engine: MIM names and panel time markers (i.e., date range from 07/30/2013 to 03/31/2014). This first-stage data collection process yielded an initial pool of 361 news items without duplicated articles. In the following stage, a researcher initially refined and expanded the list of actions and categories to ensure their comprehensiveness and relevance to the MIM industry. Besides we carefully examined business press and industry-specific research to better understand the industry and the nature of actions and refined the list of actions. Based on this process, we identified a total of 29 different types of actions (e g. releasing game center, integrating platform, developing O2O program et al.) and prepared detailed definitions and key words of those actions for our coding scheme.

Using the coding scheme discussed above, two expert coders separately coded the news articles recording the date, coding the action type and identifying whether a competitive action was a response to a previous action. Finally, we identified 141 competitive actions. Using the procedure of Perreault and Leigh (1989) to estimate the reliability of our coding, we achieved a reliability index of 0.86, which exceeds the convention of 0.70 (Denzin and Lincoln 2000). After coding process, we use expert evaluating method to further organize actions into four categories that is innovative-tactical action, innovative-strategic action, efficient-tactical action and efficient-strategic action. Utilizing expert evaluating process, 29 types of actions (See Table 2) were initially rated by three IS graduate students and a PhD student. Whenever there is a disagreement, we will present it to a postdoctoral student and an associate professor of IS. They will ensure our typology and give us the final edition. Our coding process yielded following seven categories: product innovation (e.g., mobile payments), marketing (e.g., general advertising and promotion of MIM), new functions (e.g., micro video), new services (e.g., membership services), business strategy (e.g., entry into new international markets), resources reservation (e.g., recruit new staff member) and platform integration (e.g., integrate platform).

| Categories of actions | Descriptions |
|---|---|
| Product innovation | Actions of firms focus on innovation based on MIM, e.g., game center, mobile payments, internet financial et al. |
| Marketing | Actions of advertising and promotion of MIM |
| New functions | Actions of increasing new function of MIM itself and strengthening user experience of MIM, e.g., micro video, upgrading MIM et al. |
| New services | Actions of providing new services to both user and business, e.g. legalized services of public accounts et al. |
| Business strategy | Actions of firms corporate with others and entry into new international markets. |
| Resources reservation | Actions of firms accumulate human resources and other resources. |
| Platform integration | Actions of integrating platform so that users can share cross platform. |

*Table 1.        Descriptions of competitive actions of MIM*

| Type of action | Description | Key words |
|---|---|---|
| Releasing game center | Add game service into MIM | Releasing, mobile phone gaming, game center |
| Free stickers | MIM provide free stickers | Free, sticker |
| Launch the browser / computer version | MIM launch computer version | PC Client, browser version |

*Table 2.        Examples of general types of actions*

### 3.3 Effects of Action Data

One of the biggest challenges in competitive dynamics study is identifying competitive responses. The original method proposed by Chen et al. (1992) relies on an explicit reference to an earlier action in the press article like "… in responding to…" "…following…" "…match…" "…under the pressure of…," "…reacting to… ,". However, not all articles actually make such references. Therefore, an alternative coding approach is to focus on finding competitive moves that are similar to earlier actions (Boyd & Bresser 2008). Accordingly, our approach is matching competitive actions and responses in the same type. We were also rigorous in tracing streams of actions and responses, adopting the established procedures used in competitive dynamics research (Smith et al., 1991, 1992). Finally, 113 validated samples were captured.

*Number of Responses*

Number of responses was defined as the total number of competitors who actually respond to an action. It was determined by counting the number of MIM that responded to an action as reported in published news reports. If WeChat implemented an action, Easychat and Laiwang both responded, then number of responses is 2.

*Response Timing*

Response timing was defined as the length of time a competitor takes to respond to an initiator's competitive action. It was measured as the number of days between the dates a specific action was first reported in published news reports and the date that journal first made public the news's response. Especially, owing to the limitation of time window that we choose, some types of action may be not responded during the time window. So according to the definition of far outweigh in mathematics, we contend that the response timing of those which doesn't have responses is the date between the action and March[31] 2014 times 100.

*Response Quality*

Response quality was defined as the impact of a certain action. If the response results in immensely impact to initiator, we can view that response of high quality. Specifically, if there is no response, then response quality is assigned to 0; if the response is simply imitation without new refinement, then response quality is assigned to 1; if competitor responds an action adding new functions and refinements, then the response quality is 2.

## 4    RESULTS

Figure 3 shows the breakdown of competitive action by categories listed in Table 1. It can be seen in this figure that product innovation, marketing and new functions are the most frequently taken competitive actions of MIM and account for more than 80% of all competitive actions of MIM firms during the time window.
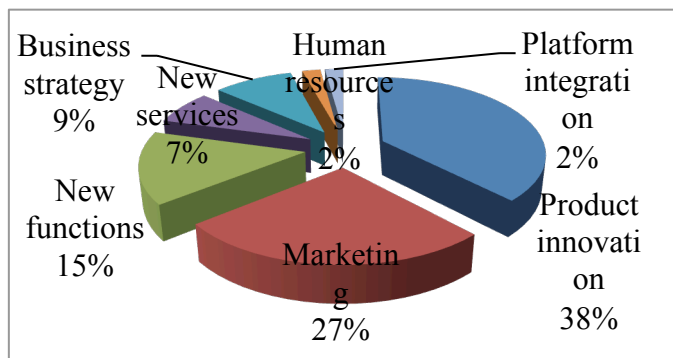
*Figure 3.        Breakdown of competitive action by categories*

Our research question is whether the effects of actions have significant difference between different types of competitive action. We separately compare efficient action and innovative action, efficient-tactical action and efficient-innovative action and innovative-tactical action and innovative-strategic action regarding number of responses, response timing and response quality. As we can see in the Table 3 below, efficient-strategic action is the most effective action while efficient-tactical action is the worst. However, this conclusion needs further test. We use T-test for independent samples to test whether the difference is significant.

| Variables | Type | Sample (N) | Mean | Standard deviation |
|---|---|---|---|---|
| Number of responses | E | 41 | 1.17 | 0.738 |
| | I | 72 | 0.43 | 0.601 |
| | ET | 33 | 1.45 | 0.506 |
| | ES | 8 | 0 | 0 |
| | IT | 16 | 0.69 | 0.479 |
| | IS | 56 | 0.36 | 0.616 |
| Response timing | E | 41 | 4792.71 | 9773.963 |
| | I | 72 | 15290.71 | 11843.053 |
| | ET | 33 | 39.42 | 41.249 |
| | ES | 8 | 24400 | 0 |
| | IT | 16 | 7698 | 11629.881 |
| | IS | 56 | 17460.05 | 11072.958 |
| Response quality | E | 41 | 0.95 | 0.59 |
| | I | 72 | 0.42 | 0.575 |
| | ET | 33 | 1.18 | 0.392 |
| | ES | 8 | 0 | 0 |
| | IT | 16 | 0.69 | 0.479 |
| | IS | 56 | 0.34 | 0.581 |

*Table 3.        Descriptive statistics[2]*

We performed further analysis in the following tables using T-test for independent samples. Hypothesis 1 predicts that number of responses, response timing and response quality has significant difference between efficient action and innovative action. The results show that hypothesis 1 is supported. So compared to efficient action, innovative action has fewer number of responses, longer response timing and poorer response quality. Overall, the results suggest that innovative action is more effective than efficient action.

| | Number of responses | Response Timing | Response Quality |
|---|---|---|---|
| Efficient | 1.17 | 4792.71 | 0.95 |
| Innovative | 0.43 | 15290.71 | 0.42 |
| T test | 5.786*** | -5.076*** | 4.675*** |

*Table 4.        Results of efficient action and innovative action [3]*

Hypothesis 2 predicts that number of responses, response timing and response quality has significant difference between efficient-tactical action and efficient-strategic action. As we can see

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[2] E refers to efficient action, I refers to innovative action, ET refers to efficient-tactical action, EI refers to efficient-innovative action, IT refers to innovative-tactical action and IS refers to innovative-strategic action.
[3] *** $p<0.001$, **$0.001<p<0.01$,* $0.01<p<0.05$.

from Table 5, hypothesis 2 is supported. So compared to efficient-tactical action, efficient-strategic action has fewer number of responses, longer response timing and poorer response quality. Therefore efficient-innovative action is more effective than efficient-tactical action.

|  | Number of responses | Response Timing | Response Quality |
|---|---|---|---|
| Efficient-Tactical | 1.45 | 39.42 | 1.18 |
| Efficient-Strategic | 0 | 24400 | 0 |
| T test | 16.525*** | -3392.628*** | 17.333*** |

*Table 5.        Results of efficient-tactical action and efficient-innovative action*

Hypothesis 3 predicts that number of responses, response timing and response quality has significant difference between innovative-tactical action and innovative-strategic action. However, they don't have significant difference in number of responses. Therefore, hypothesis 3 is partially supported. So compared to innovative-tactical action, innovative-strategic action just has longer response timing and poorer response quality, it can't reduce number of responses.

|  | Number of responses | Response Timing | Response Quality |
|---|---|---|---|
| Innovative-Tactical | 0.69 | 7698 | 0.69 |
| Innovative-Strategic | 0.36 | 17460.05 | 0.34 |
| T test | 1.978 | -3.076** | 2.192* |

*Table 6.        Results of innovative-tactical action and innovative strategic action*

# 5        DISSCUSSION AND IMPLICATIONS

In this study, we propose a new typology of competitive actions and organize competitive actions from two dimensions: resources based (strategic versus tactical) and innovation based (innovative versus efficient). Besides, we examined the effects of different types of competitive actions in digital environment from number of responses, response timing and response quality. The research results show that innovative actions, in contrast to efficient ones, could effectively reduce number of responses and response quality, and delay competitors' response. Accordingly, innovative action or action which provides new product or services to emergent market is more effective than efficient action in digital environment. Efficient actions may not yield a sustainable competitive advantage and, in fact, may lead to intensified competition and potentially lower profit margins for all firms. For example, most of MIM firms provide stickers to users. At the first beginning, WeChat charges for that. However, Easychat and Laiwang both provide free stickers, which forced WeChat to stop charging anymore.

Specifically, compared to efficient-tactical action, efficient-strategic action could reduce number of responses and response quality, and delay competitors' response. This result is consistent with the research of Chen et al. (1992). They contend that strategic actions, in contrast to tactical ones, reduce the number of competitors' counteractions and impede the speed of response. Our results suggest that most firms are unlikely to respond and to respond quickly to strategic action, which requires significant efforts to implement.

Interestingly, inconsistent with prior research (Chen et al. 1992), the results show that innovative-strategic action, in contrast to innovative-tactical action, could reduce response quality and delay responses, but it couldn't reduce number of responses. We contend that it's the unique characteristics of digital environment that lead to number of responses doesn't have significant difference between innovative-strategic action and innovative-tactical action. The innovation characterized and hyper competitive status quo of digital environment has driven firms to respond to innovative-strategic action. Otherwise they will get out of the business. Besides, Open architectures, web services, and modular technologies, combined with reverse engineering and rapid deployment of applications

(Grover & Kohli, 2013), make it increasingly easier and quicker for competitors to imitate focal firm's action.

In this study, we proposed a new typology of competitive actions in digital environment and examined the effects of them. This research makes serval important contributions to theory and practice.

First of all, despite the fact that scholars have called for action-level research (Gnyawali et al. 2010), most of competitive dynamics research in IS focuses on business-level examining firm competitive behavior by focusing on attributes and patterns of competitive action repertoire一a series of competitive actions carried out in a given year (Joshi 2010; Chi et al. 2010; Gnyawali et al. 2010; Li et al. 2010). Our action-level study of MIM promotes better understanding of how firms interact with each other in digital environment. Besides, the examination of dyadic interaction of MIM has significance to IS researchers to study competitive interaction in new IT market.

Second, prior research in strategic management has organized various types of competitive action into the broad dichotomy of "strategic" versus "tactical" (Porter 1980; Chen et al. 1992). However, we organize competitive action in digital environment from two dimensions: resources based and innovation based which can accurately reflect the characteristics of digital environment. The new typology of competitive action helps us identify competitive actions in digital environment more precisely and helps to find the nature of competitive actions and responses in digital environment. Moreover, it can provide new research clues of competitive dynamic research in digital environment.

Our findings have important managerial implications. An understanding of the nature of competitive actions in the industry and the types of competitive actions undertaken by dominant and successful players will help managers to better understand industry dynamics and to develop appropriate strategies to compete in the industry. On the one hand, firms can thrive on digital uncertainty through learning new knowledge and acquiring new resources to implement innovative actions so that they can enjoy their monopoly and obtain huge profits. However, it's worthy of taking steps to raise barriers to imitate. Besides, from the standpoint of RBV, it's harder for competitors to respond effectively when focus firm use heterogeneous resources to implement an action.

On the other hand, despite the fact that innovative-strategic action couldn't reduce number of responses, it can effectively reduce response quality and delay competitors' response. Moreover, normally innovative-strategic action is focal firm invests in significant commitment of resources to implement innovation action. Therefore, firms can use this kind of competitive action to positively reshape market and industry environment, be the first mover thus creating digital uncertainty to competitors. Like Larry Page, Google's CEO, said Google is investing the future.

In conclusion, we delved into the types of competitive actions and its responding effects in digital environment. Besides by examining the effects of different types of actions in action-level, we find that innovative-strategic action is the most effective action in digital environment despite the fact that it can't reduce number of responses. Our research offers a complete competitive picture of MIM that helps managers to better understand the industry and give them insight to formulate business strategy. Nevertheless, our paper has some limitations. The conclusion still needs to be examined since our research sample is just from MIM. It's not enough to just examine the effects of competitive actions from competitors' response. In the following study, performance variable is considered to objectively measure whether a competitive action is successful. Besides, we just focus on externally directed and market based competitive actions and didn't concern about firm's internal attributes and how them influence firms' formulation of external competitive actions.

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