The Impact of Technological Capabilities on Online-to-Offline Commerce: A Case of Micro-enterprises' Cluster Performance

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Abstract: The purpose of this study is to explore the feasibility of micro-enterprise applications in e-commerce O2O and to understand the impact of ICT and non-ICT capacities in different O2O models on micro-enterprise performances; we try to explore its influencing factors. This study collects data through interviews and secondary data. Data analysis for each micro-enterprise cluster interviewed consisted by utilizing and categorizing the data collected during 7 interviews. According to the results of the interview, this study found several different clustering patterns, brand model, clustering innovation model, and e-commerce platform model.

Key words: Technological capabilities, online-to-offline Commerce, micro-enterprises' cluster performance.

1. Introduction

Porter [1] states that companies can achieve competitive advantage through innovation and innovation required pressure, concerns, or difficulties to be accomplished. Micro-enterprises (MIEs) compete not only with large and medium enterprises but also include other MIEs in the same industry. Competition urges enterprises to innovate and grow continuously, thus creating new opportunities.

O2O commerce can be achieved through several ways. Most of the micro enterprises use social media as a channel to achieve O2O by advertising brands and activities such as coupons and promotions, bringing people from online to spend in physical store.

Information and communication technology (ICT) capabilities, an enterprise's ability, strategically use a wide array of technologies for business purposes. This study suggests that ICT capabilities can be used to improve the e-commerce performance of micro-enterprises.

The background of this study is based on the government counseling program. In order to explore the feasibility of micro-enterprise applications in e-commerce O2O (Online-to-Offline, Offline-to-Online) and understand the impact of ICT and non-ICT capabilities in different O2O models on micro-enterprise performance; we try to explore its influencing factors.

In light of these concerns, this paper has two purposes:

1) To investigate the status of micro-enterprises cluster O2O.
2) To explore the impacts of micro-enterprise capabilities on O2O cluster performance.

Research questions are as follows:

1) What are the micro-enterprise cluster O2O's technological capabilities?

2) What is the successful pattern for micro-enterprises adopting cluster O2O?
3) What are the types of micro-enterprise cluster O2O?
4) What are the influential factors for O2O and its effectiveness on the micro-enterprise cluster?
5) What are the impacts of technical or non-technical abilities on the micro-enterprise cluster?

2. Literature Review

2.1. Integration of Online and Offline Channels

2.1.1. Conception of online-to-offline commerce

O2O commerce is the use of online and mobile to drive offline local sales or redemption or an offline purchasing propelled by the web and it is a necessity for the continued breath and ultimate survival of local brick-and-mortar business. O2O enables local businesses to monitor and measure what works and what doesn't [2]. Not only local, but almost all the brick-and-mortar business is trying to achieve O2O due to the broad usage of Internet. Tsai, Wang, Lin, and Choub [3] explain that bricks-and-mortar retailer wants to provide advertisement information to attract people nearby to walk-in and shop while the online retailer also wants to attract consumer placing orders from their mobile devices whenever they are at physical stores.

Phang, Tan, Sutanto, Magagna, and Lu [4] consider O2O commerce provides traders the opportunities to affect consumers both online and offline. Merchants may try to build up online product knowledge and consciousness through advancing content generation about their products.

Tsai, Yang, and Wang [5] propose the O2O commerce service model and adopt the social relationship dashboard as a pilot study, helping retailers or brands to understand their customers through the social network (Facebook) existing data. The top area indicates the real-world (offline) marketing service model whereas the bottom area indicates the online marketing service model. The result shows that the real-time and other numerous characteristics of social media enable retailers and brands to adapt the current social commerce strategy more quickly and efficiency.

O2O commerce can be achieved through several ways. Most of the micro enterprises use social media as a channel to achieve O2O by advertising brands and activities such as coupons and promotions, bringing people from online to spend in physical store. It is easier and more effective for a relatively small market size such as Taiwan to involve in click-and-mortar business. The development of online marketing helps the form of virtual sales and increases the salary from only through physical stores (offline) to both offline and online. O2O also leads to the rapid innovation, the evolution of network services, and creates new business opportunities, which indirectly highlights the Internet as a vital medium for micro enterprises to survive in such a competitive environment.

Micro enterprises should be aware of the environmental changes and emerging technology trends, and discern the opportunities to transform into click-and-mortar hence offers new business opportunities to fit into the mainstream.

2.1.2. Online-to-offline models

Xu and Zhang [6] subdivide O2O commerce into four types of operation modes:

1) Online-to-Offline: The enterprise first develops an online platform, then offline business flowing into the online marketing and trading. At the same time, the offline consumers can enjoy the corresponding offline service.
2) Offline-to-Online: The enterprise first develops an offline platform, based on the platform of offline marketing, allowing users to enjoy the corresponding service experience. Meanwhile the offline business flow will go into the online platform and trade online, thus promoting offline to online interaction.

3) Online-to-Offline-to-Online: The enterprise develops an online platform for marketing thus online business will flow into offline again, enabling users to enjoy the service experience and consume online.
4) Offline-to-Online-to-Offline: The enterprise first develops an offline platform for marketing, then import the offline commercial flow into the online platform or adopt a third-party online platform, offering the users to enjoy the offline consuming experience.

2.2. Cluster Performance

Tseng and Shih [7] propose that cluster innovation comes from the diverse development under multi-oriented intersection. In addition to retaining the original clustering network, micro enterprises are required to explore new network and restructure both old and new network through clustering innovation. The combination of networks expands the company size, enhances industrial efficiency and most importantly, elevates the ability to innovate. In addition to partners within the cluster, activities such as participation in exhibitions and cross-industry cooperation may exploit new innovative products or services, not only within the same industries but also across industry borders for better mutual support. Peters, Sievert and Strupat [8] propose that number of customers, monthly sales, monthly wage payments and monthly value added are used to evaluate firm performance.

Financial is one of the indicators to assess organizational performance [9]. Cluster performance will be analyzed using both financial and non-financial aspects in this paper. The financial side includes performance growth and staff increased while the non-financial aspects determine whether the micro-enterprises achieve cross-industry cooperation and innovation, and the increase of sales channels.

2.3. Technological Capabilities

In this study, technological capabilities are divided into ICT (Information and Communication Technology) and non-ICT. For an individual, technological capabilities refer to the use of modern technology products, IT, networks, and so on. For a company, technological capabilities refer to the company's informatization, and the use of technology by employees to make the company profitable.

Therefore, we define ICT capabilities as the abilities of enterprises to strategically use a variety of technologies for business purposes. It also refers to the basic to the very complex technology [9]. In this study, ICT capabilities include the use of intranets, extranets, ERP, SCM, e-commerce and other related technology applications, especially for small enterprises [10]. ICT capabilities are particularly beneficial to small companies in several ways. They are primarily associated with the usage of ICT to improve internal efficiency, initiate and maintain cooperation with external partners, and improve internal and external communication. ICT plays an important role in developing other firm capabilities for customer management, process management, and performance management [9]. Parida *et al*. [11] state that ICT capabilities influence dynamic capabilities of small firms. Specifically, the usage of ICT for internal efficiency positively influences adaptive capabilities, collaborative use of ICT positively influences networking capabilities, and also positively influences both adaptive and innovation capabilities. They define ICT capabilities as the internal usage of IT, collaboration, and communication. Non-ICT capabilities refer to the capabilities other than ICT, including product and brand design, brand marketing, management, collaboration, and so on.

3. Methodology

3.1. Research Design

The objective of this study is to explore the ICT and Non-ICT capabilities that influence the O2O performance of micro-enterprises' cluster. The O2O cluster performance is categorized into financial and non-financial aspect as shown in Figure 1. The results are proved based on the data collected through

interview and secondary data.

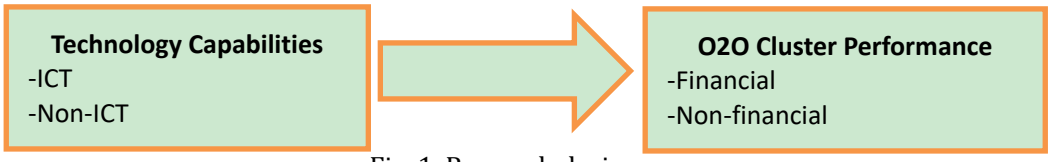


Fig. 1. Research design.

3.2. Instrument

Yin [12] points out that case studies are a practical way of investigation. When the line between the phenomena studied and real life is not clear, investigate the status quo through multiple sources of evidence. In this study, triangulation method was used to increase the validity and reliability of the constructs, including: 1.Triangulation of sources, 2.Triangulation among different evaluators, 3.Different views on the same data set (theoretical triangulation), 4.Methodology Triangulation.

In order to confirm the correctness of the data, the triangulation method was adopted to study the correctness of cross-examination of the interview data by several team members, which include the comparison with secondary data, confirmation of data directly with the guidance team and counseling team, and recommendation through the expert meeting.

This study collects data through interviews, requires the point of view and answer of the interviewees toward the interview questions, according to the situation of the cluster. Due to the lack of literature discussing technological capability as a factor that influences micro-enterprises' O2O clustering performance, thus the research was designed as a case study to provide insight into this issue.

3.3. Subjects and Data Collection Procedure

In this study, we propose the following two different methods. Subjects and data collection process include interview process records, interview verbatim records, secondary data collection, etc.

The interviews were carried out with the consent of the respondents for the usage of a voice recorder and camera to record the interview processes. The contents were also recorded by the interviewees in papers to ensure the correctness of the contents recorded. The contents were recorded into transcripts three days after the interviews, then the interviewers were asked to modify the transcript according to the content recorded to increase the reliability and validity of the interviews.

Data analysis was conducted by utilizing and categorizing the data collected from the 7 interviews. The average interview time is one hour.

According to Yin [12], the definition of case study data, the secondary data of this research include the cluster counseling report of the year 2016,14 mid-term and final presentations, and 7 proposals of the clusters. In this study, the subjects were selected by means of sampling, and the subjects were asked to select the most suitable sample for the purpose of the study, which was also called the judgment sampling. The logic and effectiveness of the samplings are based on the choice of information-rich cases to do an in-depth study. Therefore, the research team entrusted the colleagues of relevant units to select the network with the integration of successful case. The seven clusters' codes, major commodities, and their number of members are shown in Table 1.

Interview questions:

1) What are your company's (MIEs) entity channels?
2) What are your company's (MIEs) virtual channels?
3) How much is the ratio of both entity and virtual channel in the actual performance of your business?
4) Do you have some real cases of the entities channels brought by the virtual channel?

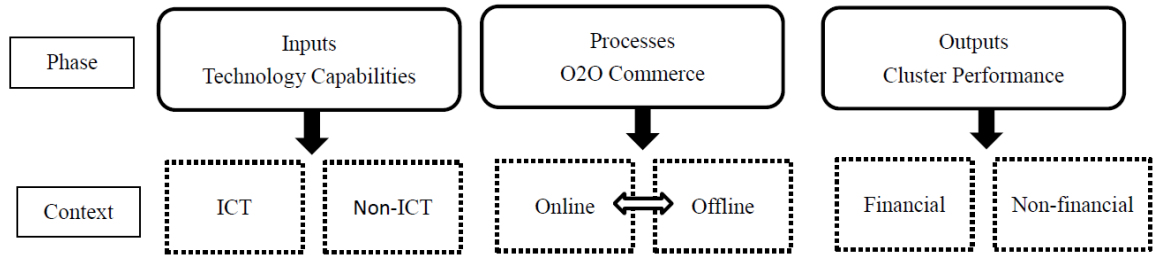
5) What is the key factor to achieve O2O commerce? What is the biggest challenge?

Table 1. Interview Objects

NO	Code	Number of Members	Major Commodities
1	S1	18	organic goods
2	E1	15	handicrafts
3	S2	15	wedding-related industries
4	N1	15	food-based souvenirs
5	M1	15	food-based souvenirs
6	N2	15	handicrafts
7	M2	16	food-based souvenirs

3.4. Data Analysis

This study refers the model for evaluating the overall internal technological capability, proposed by Lee and Lee [13] and verify the conceptual framework developed for assessing the technology capabilities to influence cluster O2O performance. Based on the input-process-output (IPO) model analyze the phase and context, and finally collated into a table. Data analysis model is shown in Fig. 2. The inputs, processes and outputs phase refer to technology capabilities, O2O commerce, and cluster performance respectively.



Phase	Technology Capabilities		O2O Commerce		Cluster Performance	
Context	ICT	Non-ICT	Online	Offline	Financial	Non-financial
Description						
			O2O			

Fig. 2. Data analysis model (Source: Lee and Lee [13] P7).

4. Results

The results of the study are based on the data analysis model, the interview and secondary information summarized as follows.

4.1. Technology Capabilities

Technology capabilities were summarized as ICT and Non-ICT capabilities after the interviews and secondary data collating.

ICT capabilities in the website refer to the capabilities of website design and maintenance while the ICT capabilities in Internet marketing includes: 1. E-commerce management capacity, 2. Capability of launching and selling products on e-commerce platforms, 3. Social media fan page management, 4. The use of Google Analytics, 5. The use of digital marketing tools (LINE@).

Non-ICT is summarized as: brand, product, and marketing. 1. Brand: Product brand design, Collaborate on brand marketing, Co-branding, Brand image enhancement. 2. Product: Improve product packaging, Cooperative innovation of product, Product packaging design, Repackaging design, Innovative product design, Collaborative design. 3. Marketing: Co-marketing.

The ICT and Non-ICT applications are described in Table 2. For example, the cluster E1.

1) Fairs activities at Yilan Station Square once a month.
2) Product integration and innovation, such as "red yeast rice sheep soup".
3) O2O commerce, the members of the cluster share and manage a common fan page.
4) Acquisition of government resources to support the exhibition abroad.

Table 2. ICT and Non-ICT

Context	ICT	Non-ICT	Cluster
Description	Official website design	Product brand design	S1
	Capability of launching and selling products on e-commerce platforms	Improve product packaging Collaborate on brand marketing	
	Capability of launching and selling products on e-commerce platforms Social media fan page management	Cooperative innovation of product	E1
	Official website design	Co-branding	S2
	Capability of launching and selling products on e-commerce platforms	One-stop wedding design	
	Capability of launching and selling products on e-commerce platforms	Product packaging design	N1
	Social media fan page management Internet marketing capability	Co-marketing Brand image enhancement	
	Capability of launching and selling products on e-commerce platforms	Repackaging design	M1
	Social media fan page management Capability of website maintenance Internet marketing capability	Co-marketing	
	Capability of launching and selling products on e-commerce platforms The use of Google Analytics The use of digital marketing tools (line@) Internet marketing capability	Innovative product design	N2
	Capability of launching and selling products on e-commerce platforms Capability of website maintenance E-commerce management capacity Internet marketing capability	Product packaging design Collaborative design	M2

4.2. O2O Commerce

According to the results of the interview, the real cases of the entities channels brought by the virtual channel (O2O commerce) is shown in Table 3. These real cases include

Table 3. O2O commerce

Context	Online	Offline	Cluster
Description	Website, E-commerce platform	Exhibition, Marketing	S1
	O2O - Facebook fan page, Line@, E-commerce platform	Exhibition, Marketing	E1
	O2O -After the mainland exhibitors continue to contact the network through the buyer -Market lottery tickets to promote repurchase rate		
	Online -	Exhibition, Marketing	S2
	O2O Through the network to attract foreigners to Taiwan to shoot wedding, so that customers purchase orders from the Internet		
	Facebook fan page, E-commerce platform	Overseas exhibition Physical stores	N1
	O2O - Facebook fan page, E-commerce platform, Official website	Exhibition, Stores	M1
	O2O -The development of collaborative e-commerce platform (OTOP) to promote the collaborative brand and expand new channels (physical stores) - Promotion through Facebook fan page to attract customers consume in physical stores.		
	line@, Official website, E-commerce platform	Exhibition, Stores	N2
	O2O - line@, Official website, E-commerce platform	Physical stores	M2
	O2O- Japan e-commerce platform		

1) The consumption in physical store after the purchase from the Internet.
2) The selling of coffee through LINE@ and conduct the consumers back to the physical store.
3) New cooperation channel through the collaboration in virtual channels and participation in marketing.

We discover the important keys and challenges to achieving O2O commerce:

1) Continue to contact after the exhibitions.
2) Handicrafts are required to be seen by consumers during the exhibitions in order to achieve consumption and performance.
3) The government must provide adequate resources and funds.
4) Their own products need to be innovative and competitive.

4.3. Cluster Performance

The financial aspect refers to the increase in annual turnover while non-financial includes expansion of channels, the design of product and brand, etc, as shown in Table 4. It can be seen that most of the clusters have grown to prove that O2O commerce is significant. Most of the clusters have successfully enhanced their annual turnover and also accomplished exhibition marketing, overseas exhibition and design of product trademarks and so on. For example, M1, N2 and M2 with the achievement of new channel expansion and participation in the exhibitions.

Table 4. Cluster Performance

Context	Financial	Non-financial	Cluster
Description	-	Development and design of the cluster's official website and online mall	S1
	2015 Annual average turnover of 1 million, 2016 is 900,000. Agglomeration enterprises or individuals with an average annual turnover growth of 20% over last year.	To assist the members to complete the design and registration of product trademarks and to conduct brand marketing	E1
	2015 average turnover of 1.44 million, 2016 is 2.16 million. Agglomeration enterprises or individuals with an average annual turnover growth of 10% over last year.	Package or value-added trip to reach the annual number of orders 12 Agglomeration enterprises or individuals to participate in external activities or exhibitors up to 2 times	S2
	2015 Annual turnover of 141.3 million, 2016 is 162.5 million. Annual turnover growth of 15%	Participation in overseas exhibition Development of collaborative e-commerce platform	N1
	2015 Annual average turnover of 4.19 million, 2016 is 4.33 million	Participation in exhibition, Channels expansion	M1
	2015 Annual average turnover of 100 to 120 million 2016 Annual turnover of 140 million	Cross-industry collaboration, Channels expansion, Participation in exhibition, Development of collaborative e-commerce platform	N2
	2015 Annual average turnover of 350 million 2016 Annual turnover of 150 to 200 million	Cross-industry collaboration, Channels expansion, Participation in exhibition	M2

5. Discussion and Conclusions

In conclusion, technical capabilities can assist micro-enterprises in O2O commerce by using ICT to improve the organizational performance and thus improve the clustering performance [9]. In this study, members' ICT capabilities were improved with the help of clustering, thus enhancing their performance.

Thus, this study found several different clustering patterns.

1) Brand model: Non-ICT is mainly related to Non-ICT design capabilities, such as: S1 heightens the members' product image by adding the cat character onto the product packages, S2 is the only cluster which its members are engaged in the same field, the wedding related industries.

2) Clustering innovation model: Almost all of the clusters are innovative, whether it is cluster's internal innovation or cross-group innovation.
3) E-commerce platform model: It is the ICT capacity of the show, cluster S1, N1, M2 developed their own e-commerce platform while the others are using the existing platforms to sell goods.

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