The Performance and Value Creation of E-commerce Ecosystems in Rural China: A Perspective of Systems Theory

Completed Research Paper

Lifang Peng **Jen-Her Wu**

Yi-Cheng Chen **Chun Cheng**

Qi Li

Abstract

Drawing upon the theoretical perspective from systems theory, this study develops an explanatory model to explore how integration effort, compatibility and realized synergy affect value and performance creation among EC ecosystems in rural China. Data gathered from the EC ecosystems of Taobao platform through a large-scale online survey were used to test the hypotheses. The partial least squares technique was used to validate the proposed research model. The findings provide empirical evidence that integration effort have a positive impact on realized synergy and compatibility; compatibility has a positive impact on realized synergy; realized synergy has a positive impact on value; value has a positive impact on performance. Finally, our results suggest that integration effort, compatibility and realized synergy collectively have significant impacts on EC ecosystem value and performance creation.

Keywords: EC ecosystems, Taobao Villages, rural China, systems theory

Introduction

With the booming of electronic commerce (e-commerce, EC), the emergence of a few Internet giants has driven the rapid development of emerging business applications and created noteworthy market opportunities in China. Since the rapid expansion of EC environment, some EC ecosystems (EC clusters or EC villages) have appeared in rural China. Such innovative type of EC business model is also well known as Taobao Villages after the EC platform owned by Alibaba (Ou & Davison 2009; Lee &

Mueller 2017; Li 2017). The EC platform can empower villagers in remote villages causing the emergence of rural EC ecosystems that changed the information and communication technology (ICT-) enabled open innovation in rural and marginalized communities in remote areas of China (Cui et al. 2017; Someh et al. 2016; Yue et al. 2015). "Taobao Village" is a classic example of the successful transformation of rural China through e-commerce (EC). It can not only help rural areas develop distinctive industries, but also can promote employment opportunities in rural areas. However, the current studies on the business value of ICT do not consider the elements of the new kind of cyber-ecosystem, and there are few concrete empirical studies to illustrate rural EC ecosystems which from the initial three Taobao Villages in 2009, during the nearly 10 years, the number has grown to more than 3,000 in 2018 (Ali Research, 2018). Given that the rapid expansion of Taobao Villages across rural China could help develop the community infrastructure, boost the stagnant rural economy and alleviate poverty of poor villages, it is becoming an irreversible and up-swing trend in rural areas of China (Ben et al. 2017; Li 2017).

The evolving phenomenon of rural EC ecosystems is a brand new and critical EC issue that has not been fully investigated. Yet, given the rapid evolutionary platform in an EC ecosystem, the antecedents affecting realized synergy around an EC ecosystem for further value and performance creation are becoming a critical research issue (Lang & Li 2013; Leong et al. 2016; Li 2017). In a self-organized EC ecosystem of Taobao Villages, integration effort, EC ecosystem compatibility, platform compatibility, realized synergy of information technology (IT) assets are identified as productive resources that play key roles in facilitating value creation of EC ecosystems. Although these critical factors are especially salient in an EC ecosystem seeking to create their own value, our focus is on elaborating our understanding of how the above mentioned critical antecedents can realize the synergy between resources and ICT-enabled assets and further facilitate value and performance creation in an EC ecosystem in rural China. By extending the theoretical perspective of Nevo and Wade's general systems theory, three research questions are proposed to examine (1) how compatibility (i.e. platform compatibility and EC ecosystem compatibility) are affected by integration effort; (2) how realized synergy is collectively influenced by integration effort, compatibility; (3) how value and performance are influenced by realized synergy in an EC ecosystem's in rural China?

Literature Review and Hypotheses Development

The Fast Expansion of Taobao Villages in Rural China

Since the mid-2000s with the rapid expansion of EC cyberspace, some rural EC ecosystems have appeared in China. In recent years, China central government has encouraged the development of EC in the rural areas, and has announced the new-type urbanization as a critical strategic policy to advance the stagnant rural economy and alleviate poverty in rural China (Guo et al. 2014; Leong et al. 2016; Yue et al. 2017).The rise of rural EC villages (EC clusters or EC ecosystems in this study) in China, better known collectively as Taobao Villages, offers a potential solution to rural underdevelopment in China (Guihang 2014; Li 2017). According to Alibaba's official documents, the term "Taobao Village" refers to a village in which villagers use Taobao platform as their primary EC platform, total annual EC transactions exceed RMB 10 million, and at least 10% of village households are engaged in EC, or 100 online shops are opened by villagers (Ali Research 2018). Operated by Alibaba, three out of four online sales in China occur on Taobao platform. With such platform, Alibaba provide the opportunities for rural villagers to operate EC commercial businesses and many of them have become successful (Cui et al. 2017; Li 2017). From early 2010 to now, the number of Taobao Villages have experienced exponential growth that also make a remarkable growth of rural online consumers in China. In 2014, Taobao established many service centers at both the county and village levels to seamlessly connect villages through its EC platform to offer rural villagers a wide range of ICT infrastructure resources and provide online business services to the socially disadvantaged in villages (Long et al. 2016; Oreglia 2014; Xia 2017). Alibaba also collaborated with various levels of government in different provinces to promote rural Taobao projects and alleviation programs. As of March 2017, Taobao has established its presence in 29 provinces, covering more than 600 counties and 30,000 villages, according to Alibaba.

IT-Enabled Resource Formation in an EC Ecosystem

The Taobao platform is designed to connect businesses in new ways with ICT-enabled open innovation that enable EC ecosystems of Taobao Villages to develop interactive business connections with and among EC ecosystem members in a self-organizing EC ecosystem (Leong et al. 2016; Oreglia 2014). It can feature strong community-orientation among EC ecosystem members. Through the offerings of a wide range of online services and ICT-enabled assets that organize various EC training programs for interested rural e-tailers, and that provide cultural/social services to the socially disadvantaged in villages, the platform can also facilitate value creation for EC ecosystems in China's Taobao Villages (Leong et al. 2016; Lang & Li 2013; Lin et al. 2016). In such an EC ecosystem, systems theory is silent on the issue of performance and value creation that may be ascribed to the synergistic relationship between EC ecosystems and Taobao platform compatibility. Nevo and Wade (2010) proposed a synthesized model to supplement the theoretical perspective of resource-based view (RBV) with concepts from systems theory. Their theory regards information technologies (ITs) as being comprised of interacting components that give rise to emergent system capabilities (Nevo & Wade 2010, 2011).

According to Nevo and Wade (2010), integration effort is distinct from compatibility since the latter concerns the fit between two system components as perceived by attempts of management to facilitate the successful combination of components. Specifically, the same activities to facilitate the successful combination of components taken by management to help with the integration of an IT asset into a virtual community resource can also have a positive effect on their mutual compatibility. That is to say, some hands-on training and involvement with the implementation can help reduce incompatibility between users' existing technical knowledge and the skills necessary to make use of the IT asset (Nevo & Wade 2010, 2011). In this study, integration effort is defined as the activities undertaken by the critical facilitators to support, guide, and assist with the implementation of ICT assets to generate ICT-enabled resources in an EC ecosystem of Taobao Villages. In the research context of this study, resource compatibility is identified as two different constructs: EC ecosystem compatibility and platform compatibility. EC ecosystem compatibility is defined as the ability of EC ecosystem's commercial governance mechanism to integrate EC infrastructure through the Internet, involving the flows of information, money, and goods with Taobao Village resources to form a synergistic relationship. Regarding platform compatibility, it is defined as the ability of ICT assets and resources embedded in Taobao Village to form a synergistic relationship.

By adopted Nevo and Wade's theoretical perspective regarding systems theory of ICT-enabled resource formation mechanism, two important enablers should be considered in the context of an EC ecosystem. First, as an EC ecosystem, ICT-enabled resources must consist of components that are compatible. Second, to become a unified ecosystem, the components of the ICT-enabled resource must be integrated. The mere combination of any components is not sufficient to guarantee a synergistic outcome even when inspection of the individual capabilities of each component suggests the potential for a synergistic relationship (Wu et al. 2016). The EC ecosystems need to fully understand the commercial governance mechanism and functionality of the ICT of an EC ecosystem on Taobao platform and how it works to incorporate the ICT into its business practices. That is to say, the tasks and responsibilities of an EC ecosystem are compatible with the functionalities of the ICT. Instead, the realization of synergy depends upon the mutual compatibility of the ICT-enabled components and resources (Nevo and Wade 2010, 2011). Likewise, EC ecosystem compatibility and platform compatibility must also exist between an IT asset and the virtual community resource of a self-organizing EC ecosystem with which it is combined through the integration effort of an IT asset into a virtual community resource to achieve ICT-enabled open innovation in an EC ecosystem. Hence,

H1a: Integration effort is positively associated with compatibility (EC ecosystem and platform compatibilities in an EC ecosystem.

ICT-Enabled Resources and Synergistic Relationships in an EC Ecosystem

In order for an IT asset and an organizational resource to become a system, the related components in a self-organizing EC ecosystem must be integrated. IT asset and organizational resource integration effort represents activities undertaken by the facilitators (e.g., Grassroots leaders, e-tailers, government

officials, third-party EC service providers, etc.) of Taobao Village to support, guide, and assist with the implementation of the IT asset within the EC ecosystem resource (Nevo and Wade 2010, 2011). By instituting proper EC ecosystem structures and providing relevant technical and procedural guidance before, during, and after the implementation of an ICT asset into an EC ecosystem resource, Taobao platform can help with the realization of synergy. Drawing on the synergy perspective from Nevo and Wade's (2010, 2011) unified model, we define realized synergy as the positive emergent capabilities that accrue from the relationship between ICT assets and Taobao Village resources that would make the ensuing ICT-enabled resources more likely to achieve their tasks or aims. These capabilities would make ICT-enabled resources more likely to achieve EC ecosystem members' or EC ecosystems' tasks or goals in an EC ecosystem. The existence of a positive relationship between members of EC ecosystems and EC platform facilitates the synergy between the virtual and physical resource channels and also empowers EC ecosystem members' in an EC ecosystem to increase their efficiency in interacting with each other (Cui et al. 2017; Wu et al. 2016; Yue et al. 2015). This induces members of EC ecosystems in an EC platform to maintain frequent and close synergistic relationships with some members, facilitates them in knowing one another, allowing them to share information and create a common point of view. As mentioned above, integration effort is distinct from compatibility since the latter concerns the fit between two system components, while the former describes the attempts of management to facilitate the successful combination of components (Nevo and Wade 2010). The members of EC ecosystems can comprehends how the ecosystem works and understands the governance mechanism of the EC ecosystem. Besides, they need to understand the differing roles of the service providers within the ecosystem to effectively leverage the ecosystem resources into its business practices to achieve their business aims. By instituting proper organizational structures and providing relevant technical and procedural guidance before, during, and after the implementation of an IT asset into a virtual community resource, management's integration effort can help with the realization of synergy in an EC ecosystem. Accordingly, we hypothesize that the extent of the integration effort would have a positive effect on the extent of synergy realized from a relationship between an IT asset and an organizational resource in a self-organizing EC ecosystem. Thus,

H1b: Integration effort is positively associated with realized synergy in an EC ecosystem.

Through the implementation of the ICT, Taobao community can extends the emergent capabilities of the EC ecosystems to increase their business operation efficiency and create synergies within the EC ecosystem. Such capabilities enable EC ecosystems quickly adapting to environmental changes by customizing their products and tailoring their roles based on the needs of the ecosystem (e.g., diversification of services). Indeed, the Taobao platform can just to help realize the synergy by increasing efficiency in an EC ecosystem's value chains, delivering new customer values, and expanding the market bases. The platforms of such new type of EC not only need to provide members of EC ecosystems a convenient and safeguarded e-marketplace of good deals, but also retain online consumers by providing merchants with a suite of products and services to help commercial businesses grow and operate more effectively.

We posit that to the extent that ICT-enabled resources are valuable and rare, EC ecosystems of Taobao Villages possessing such resources are expected to improve their operation performance. Rare and valuable resources are more efficient in the sense that they enable an EC ecosystem to produce more economically and/or better satisfy customer wants as well as deliver greater benefits to their customers for a given cost. Alternatively, an EC ecosystem possessing valuable and rare resources may be more successful in maintaining its current level of operations while simultaneously enjoying an increase in revenue. Moreover, compatibility is assessment of ability of an EC ecosystem's components to interact and form a synergistic relationship; it is not assessment of the outcome of the interaction. In other words, resource compatibility represents the feasibility of the relationship, not its desirability. The construct of resource compatibility has been recognized as a factor capable of influencing the realization of synergy in different circumstances (Nevo and Wade 2010, 2011). In that sense, EC ecosystem compatibility and platform compatibility can help EC ecosystems to integrate EC infrastructure and the related ICT assets with Taobao Village resources to facilitate the realize synergy for EC operation in an EC ecosystem. Accordingly, we propose the following hypotheses:

H2: Compatibility is positively associated with realized synergy in an EC ecosystem.

Performance and Value Creation through Realized Synergy in an EC Ecosystem

From the theoretical perspective of systems theory, the extent of synergy borne out of a relationship between an IT asset and a virtual community resource can determine the ensuing ICT-enabled resource's strategic potential of value and performance creation (Nevo and Wade 2011; Qu et al. 2010). The construct of value reflects a resource's ability to help conceive of and execute strategies intended to fend off threats, capitalize on opportunities, or avoid weaknesses. The existence of a positive relationship between a resource's repertoire of capabilities and its value property. By adopted the perspective from Nevo and Wade (2010), we defined value as the ICT enabled resources' ability to help conceive of and executive strategies intended to fend off threats, capitalize on opportunities, or avoid weaknesses. From the Taobao Community's perspective, the implementation of the ICT enhances the usefulness and confidence of EC ecosystems on the platform. Besides, the implementation of the ICT can allows the e-tailers to directly connect with consumers, makes the EC ecosystem more valuable and lower the entry-barriers to for the EC ecosystems of the Taobao Villages.

There are indeed causal relationships among expected performance confirmation of ICT-enabled resource formation mechanism of an EC ecosystem (the casual effects among resource integration effort, EC ecosystem compatibility, platform compatibility, and realized synergy) facilitated by ICT-enabled innovative capital embedded in an EC village that in turn drives and value creation within the self-organizing EC ecosystem. Specifically, perceptions of facilitators and members of an EC ecosystem on resource integration effort, EC ecosystem and platform compatibility would affect their level of confirmation on realized synergy in an EC ecosystem, and would affect the potency of EC platforms, and in turn, affect value creation in an EC ecosystem (Lang & Li 2013; Lin et al. 2016; Plume et al. 2016). Thus, a greater set of capabilities, made possible by the implementation of the IT asset component, could make an ICT-enabled resource more likely to be employed in the execution of strategies for value creation (Nevo and Wade 2011; Qu et al. 2010). It is therefore reasonable to expect that a more synergistic platform with good ICT-enabled resource formation mechanism is more likely to facilitate an EC ecosystem in gaining value. Hence we hypothesize the following:

H3: Realized synergy is positively associated with value in an EC ecosystem.

Through the perspective of dynamic capability, Tuan and Yoshi (2010) explored organizational resources and argued that organizational capabilities in costs reduction, quality improvement and technology innovation can effectively facilitate modern firms to create business value and improve performance (Lim et al. 2011; Someh et al. 2016). Talaja (2012) also pointed out that the employment of ICT resource to empower resources can help firms to gain competitive advantage and further increase company performance (Nevo & Wade 2011). Cao and Duan (2013) indicated that good value-creating business models with effective business processes and structures, sound organizational structure, and empowerment of information technology of companies can reduce conflicts of interest, friction, problems or costs and improve their business performance and competitive advantages. They also confirmed that information processing capabilities can effectively improve company performance and create a sustainable competitive advantage (Cao & Duan 2013).

In this study, performance is defined as the extent to which the Taobao Community has efficiency and effectively achieved its tasks or aims (Nevo & Wade 2011). In our research context of a self-organized EC ecosystem, Taobao platform could bring new technologies to urban villages, develop various sort of industries, create many training and support opportunities to farmers/villagers in poverty-stricken rural areas and extend the emergent capabilities of the EC ecosystems to increase their business operation efficiency and create value within the EC ecosystem. Relevant stakeholders are stationed in rural areas to build commercial infrastructure such as networks, financial flows and logistics. To create an atmosphere of community integration and knowledge sharing, and to create a more market-friendly e-commerce environment for Taobao Village (Leong et al. 2016). Such capabilities enable EC ecosystems quickly responding to business environmental changes by customizing their products and tailoring their roles based on the needs of the ecosystem. Specifically, the ICT implementation into the EC clusters helps increase revenue and job opportunities, reform the fitness landscape and improve the living standard of members of Taobao community. Indeed, the Taobao platform can just to help realize the synergy by increasing efficiency in an EC ecosystem's value chains, delivering new customer values,

and expanding the market bases. The platforms of such new type of EC not only helps increase job opportunities and returnees. Operating Taobao stores in rural areas not only attracts newcomers to work in rural areas, but also enables young people working outside to return home to live with their families. Women and seniors can participate in e-commerce affairs to improve the situation of rural empty nesting (Lin et al. 2016). It can be inferred that the potential value of rural areas can generate sustainable competitiveness and further achieve the performance of EC ecosystems of Taobao Villages. Hence,

H4: Value is positively associated with performance in an EC ecosystem.

By extending the theoretical perspective of systems theory, an explanatory model and a set of hypotheses related to rural EC ecosystems of Taobao Villages in China are proposed. We adopted the perspective of synergic functionalities from systems theory (Nevo & Wade 2010, 2011) to justify the ICT-enabled resource formation constructs of resource integration effort, compatibility (i.e. EC ecosystem compatibility and platform compatibility) and realized synergy to represent the relationships between humans and their technologies for ICT-enabled resource formation mechanism that results in positive outcomes such as increased EC ecosystems' value and operation performance. We theorize that in a self-organized EC ecosystem of Taobao Villages, business value of IT assets is associated with the emergent capabilities exhibited by ICT-enabled resources produced as a result of integration between IT assets and organizational resources. EC technologies extend the capabilities, efficiency and effectiveness of an EC ecosystem through integration effort for ICT-enabled resources, in turn to realize the synergy for value and performance improvement in an EC ecosystem.

Research Methodology

The first stage in this study is to construct a conceptual framework and develop the measures. We began the scale development process by surveying the extant literature for validated scales that could be used in our study. Although we did not find complete scales that were suitable for this study, we were able to identify several items and scale fragments. We included these in the initial pool of items. Since insufficient coverage of the construct domain was deemed an issue, some new items were self-developed based on the definitions provided by the prior literature. The majority of the scale items were adopted from prior works in information systems (IS) literature but modified slightly for our research context. Once the initial list of measurement items are generated an iterative interview process involving personal interviews with a small group of experts was applied to refine the item list. The interviews were taped and reviewed by researchers to further improve the data collection quality. These interviews can allow the researchers to gauge the clarity of the scale items presented, assess whether the items list effectively captured the desired phenomenon and ensure that the salient concepts of the major constructs in our research model were not omitted. The final questionnaire for the study may consist of two parts, one including EC ecosystem basic information and the responses to the scale items of major constructs. The EC ecosystem basic information included: location in China, actor type of EC ecosystem, revenue, numbers of households and online stores, product type, and which year to join Taobao Villages. The second part contained the scale items for the major constructs of the proposed research model. All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The proposed research model was tested with data collected through online and physical questionnaires and gathered from the leaders of Taobao Village in China from two primary sources: Taobao Village Annually Forum in December 2017 and Taobao Village during January1 to March 31, 2018. Grassroots leaders, e-tailers, government officials, third-party EC service providers are qualified respondents and cordially invited to support this survey. Fifty RMB were offered for the respondent who completed the survey. The first page of the questionnaire explained the purpose of this study and ensured confidentiality. An attention check question was included in the survey questionnaire to examine if the respondents paid attention to the survey questions to ensure the quality of the data. Finally, there were 426 responses collected. The respondents who gave incomplete answers were excluded from our empirical data set. Finally, 280 participants who did not pass the attention check question or gave incomplete answers were excluded. This left us with 146 valid questionnaires (valid-return rate = 34.2%) for further data analysis. The profile of the respondents is shown in Table 1.

Table 1. The Profile of the Respondents (N = 146)

Variable	Type	Sample(N=146)	Percent
Participant Type	e-tailers	61	41.8%
	government officials	33	22.6%
	grassroots leaders	23	15.8%
	third-party EC service providers	29	19.9%
Year to Join Taobao Village	2009-2013	8	5.5%
	2014	15	10.3%
	2015	30	20.5%
	2016	25	17.1%
	2017	68	46.6%
Revenue (Unit: 1,000 RMB)	10,000-20,000	73	50.0%
	20,000-50,000	36	24.7%
	50,000-100,000	15	10.3%
	Above 100,000	22	15.1%
Product type	Agricultural products	30	20.5%
	Non-agricultural products	92	63.0%
	Both types of products	24	16.4%
Product base	Original products	75	51.4%
	Innovative products	59	40.4%
	Both type of products	12	8.2%

Data Analysis and Results

Measurement Properties

The measurement model relating the scale items to their latent constructs was analyzed using SmartPLS 3.0 M3 (Ringle et al. 2005). The assessment of item loadings, reliability, convergent validity and discriminant validity was performed for the latent constructs through confirmatory factor analysis (CFA). Reflective items should be unidimensional in their representation of the latent variables and therefore correlated with each other. Factor loadings of scale items should be above 0.707, showing that over half of the variance is captured by the constructs (Straub et al. 2004). All constructs in the measurement model should exhibit good internal consistency as evidenced by their composite reliability scores. The composite reliability coefficients of all constructs and the AVE in the proposed conceptual framework were also checked for adequacy. As shown in Table 2, the loadings for all constructs with reflective measures were well above the 0.707 guideline and statistically significant at the 0.001 level, indicating satisfactory item reliability for the reflective measures (Chin 1998). These results collectively suggest good measurement properties for all constructs.

Table 3 shows the composite reliability, Cronbach's alpha reliability average variance extracted (AVE) and square root of the AVE, as well as the correlations between the constructs. The composite reliability values for all constructs were above the recommended level of 0.70, indicating adequate internal consistency. All constructs shared more variance with their indicators than with other constructs. Thus, the convergent and discriminant validity of all constructs in the proposed research model can be assured.

Table 2. Descriptions and Confirmatory Factor Loadings of Scale Items

Construct	Scale Items	Mean (S.D.)	Factor Loading
Integration Effort	IE01-IE05	3.97~4.05 (0.91~1.01)	0.901~0.916
EC Ecosystem Compatibility	Ecom01-Ecom05	4.16~4.22(0.72~0.79)	0.841~0.887
Platform Compatibility	Pcom01-Pcom05	3.90~4.24(0.77~0.85)	0.786~0.837
Realized Synergy	RS01-RS05	4.08~4.20(0.73~0.78)	0.795~0.856
Value	Val01-Val05	4.28~4.32(0.67~0.68)	0.800~0.878
Performance	Per01-Per05	4.38~4.44(0.61~0.70)	0.846~0.894

Table 3. Composite Reliability and Inter-Correlations among Major Constructs

Construct	1.	2.	3.	4.	5.	6.
1. Integration Effort	0.91*					
2. EC Ecosystem Compatibility	0.76	0.86				
3. Platform Compatibility	0.73	0.71	0.81			
4. Realized Synergy	0.69	0.65	0.65	0.84		
5. Value	0.61	0.72	0.60	0.73	0.85	
6. Performance	0.59	0.67	0.60	0.64	0.74	0.86
Composite reliability	0.96	0.94	0.90	0.92	0.93	0.94
Cronbach's alpha coefficient	0.95	0.92	0.87	0.89	0.90	0.91
Average variance explained	0.83	0.75	0.65	0.70	0.72	0.74

Diagonal elements are the square roots of the AVE.

Test of the Structural Model

A bootstrapping procedure with replacement using 5000 subsamples was used to estimate the statistical significance of the parameter estimates. The structural model was examined and the effects among those latent constructs were also tested. A test of the structural model was used to assess if the causal relationships specified by the research model were consistent with available data. The PLS method does not directly provide significance tests and path coefficient confidence interval estimates in the proposed model. Hypotheses and corollaries testing were performed by examining the size, the sign and the significance of the path coefficients and the weights of the construct dimensions, respectively. The statistical significance of weights can be used to determine the relative importance of the indicators in forming a latent construct.

The direct and indirect effects from all of antecedents in the conceptual framework, accounting for 54.6 percent in the variance of EC clusters' value creation and 53.1 percent of the variance in performance in a self-organizing EC ecosystem. 53.6 percent of the variance in realized synergy was explained by the related antecedent constructs. Correspondingly, 64.6 percent of the variance in EC ecosystem and platform compatibilities was explained by the construct of integration effort. The magnitude and significance of these path coefficients provides further evidence in support of the nomological validity of the research model. As a whole the research model has strong explanatory power for the EC clusters' benefit creation construct in a self-organizing EC ecosystem.

The causal relationship from integration effort to compatibility and realized synergy in the proposed research model, hypotheses H1a and H1b, are strongly supported by the significant path coefficient of 0.80 and 0.35, respectively. This result implies that EC clusters with higher levels of integration effort may saliently contribute to compatibility and realized synergy in a self-organizing EC ecosystem environment. The hypothesis, H2, effectively drawn from compatibility to realized synergy, is supported with significant path coefficients of 0.42. The emergent compatibility can be produced as a

result of integration between IT assets and organizational resources through integration effort for ICT-enabled resources and in turn to realize the synergy. Besides, the hypothesis, H3, effectively drawn from compatibility to value, is also supported with significant path coefficients of 0.73.The direct effect drawn from value to performance creation is also confirmed by the significant path coefficients of 0.74. That is, the realized synergy construct apparently influences value creation and further improve performance in a self-organizing EC ecosystem environment.

Discussions and Conclusion

Drawing upon the theoretical perspective from Systems Theory, this study develops an explanatory model to illustrate the key factors behind the rapid growth of rural EC ecosystems from birth to expansion and the formation of the increasingly large group of E-commerce cluster. Building the perspective of synergy from systems theory, we developed three ideas, all of which were supported in our empirical study. Applying system theory, this study seeks to provide a theoretical framework to investigate the determinants of value and performance creation of Taobao Villages in rural China by embracing two ideas: (1) With advanced IT platform and EC ecosystem, integration effort and compatibility (EC ecosystem and platform compatibilities) may facilitate realized synergy, this can empower villagers; (2) This empowerment can influence value creation in a self-organizing EC ecosystem. Specifically, we expect that integration effort and compatibility influence synergy. Besides, synergy not only has a direct effect on value creation, but also exerts partial mediation effects on the relationship between compatibility and value creation, and the relationship between integration effort and value creation of Taobao Village in rural China. The empirical results provide evidence that compatibility has a positive impact on realized synergy; integration effort have a positive impact on realized synergy and compatibility; realized synergy has a positive impact on value; value has a positive impact on performance. Finally, the empirical research results of this paper point out that platform compatibility and ecosystem compatibility are the proper measurements of compatibility. In addition, the research also suggested that the keyman of ecosystems should integrate the efforts of related resources such as government, industry, university and institute cooperation to promote the development of the ecosystem.

Our findings offer guidelines to a self-organizing EC ecosystem platform developers, managers and initiators. Through the effects of integration effort and compatibility, the EC ecosystem can effectively realize synergy, cultivates farmers/villagers to engage in e-commerce and improve the industrial process foundation in the rural areas. It can be seen that the success of ecosystem development might depends on how the stakeholders in different sorts of aspects carry out related activities to support, guide and assist in the implementation of ICT assets and organizational resources. However, the subjects in this study are the key persons in the ecosystem, such as grassroots leader, resource integration of e-retailers, supplier partners, third-party service providers, institutional supporters, etc., so it is recommended that they integrate relevant industries in the process of promotion. The input of resources from academia, government agencies, and research institutions can create an interconnected and continuously innovated EC ecosystem. Based on the vision of a self-organized ecosystem, grassroots leaders and government officials can help establish a training system with integrated ICT assets and organizational resources to create an entrepreneurial atmosphere to empower the stakeholders in various fields of industrial value activities. By initiating EC associations or business alliances, online store operators and third-party service providers can well integrate the related resources together to facilitate the EC ecosystem to develop sustainably and form a benign and interactive industrial chain. It will accelerate the pace of sustainable development of EC ecosystems in rural areas.

Acknowledgements

This research was supported by the Ministry of Science and Technology, Taiwan under operating grants MOST 105-2420-H-110-002-MY3, MOST 106-2410-H-143 -004 and was partially supported by the Aim for the Top University Plan of National Sun Yat-Sen University and Ministry of Education, Taiwan. The authors would like to thank the Alibaba Group for arranging site visits and Mr. Yifan Zhang (President, Hangzhou Xinlongxing Commercial Development Co., Ltd. Shangcheng Branch, China) for his help in data collection.

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