A strategy-based model for implementing channel integration in e-commerce

An empirical examination

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Abstract

Purpose – The key to success in the internet business lies in how you carry out the integration between virtual and physical channels. The purpose of this paper is to aim at defining the solution to the integration.

Design/methodology/approach – Channel coordination is grounded on a new governance of integration strategy which bridges the channels. This study proposes a novel research model with three stages: first, click-and-brick strategies; second, channel coordination for three purchase stages; and third, synergy realizations. A survey was conducted for collecting empirical data. PLS was used for path analysis. In total, three separate statistical analyses were performed for three defined integration strategies.

Findings – Click-and-brick strategies have different degrees of impact on channel coordination in different purchase stages and in turn, different degrees of impact on synergy benefits. Specifically, the in-house division strategy is more important in determining channel coordination in the three purchase stages.

Practical implications – Customers initially perceive online services with a nature of low trust and view them as highly risky. This integration is useful for a firm to successfully start a new online business. Further, it provides insight into allocating a firm's resources to critical multi-channel activities to realize synergy benefits.

Originality/value – Multi-channel marketing is dynamic and complex in nature. Existing theories provide limited insight into effectively defining them. This study attempted to define a strategy-based implementation model. This model demonstrated the capability to effectively reduce the complexity of defining channel integration.

Keywords Marketing strategy, Internet marketing, Channel management

Paper type Research paper

1. Introduction

Business over the internet has fundamentally reshaped the structure of the buyer-seller relationship and offers sellers new opportunities for performing marketing activities (Hong and Cho, 2011; Oh *et al.*, 2012). Important examples, such as Amazon.com, e-Toys, or e-Bay, have shown exponential increases in customers and sales. Early predictions were that the new internet-based businesses would wipe out many existing businesses because they were able to operate with less assets and at lower cost than brick-and-mortar competitors (Shankar *et al.*, 2003; Verhagen and van Dolen, 2009). Their interactions with customers mainly occur through internet channels for product

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search, selection, order, and payment while other physical activities, such as warehousing and delivery, may be outsourced to subcontractors (Doherty and Ellis-Chadwick, 2009; Hsiao *et al.*, 2012). However, the rapid growth of the internet-based business has been slowing in recent years (Wu, 2013).

Much of that thinking has been challenged and the viability of a pure web-based model was questioned by business managers (Muller-Lankenau *et al.*, 2006). First, internet businesses dealing with physical activities cannot avoid the challenge of logistics. Fierce competition in the online market has forced greater price competition, so many firms are switching to a strategy of providing better quality service through faster delivery and quicker customer response (Bothos *et al.*, 2009). Important online retailers like e-Bay, the pioneering online auctioneer, acquired Butterfield, a traditional brick-and-mortar auction house, and Amazon, the pioneering online book retailer, found it necessary to establish a partnership with Borders, a traditional brick-and-mortar book retailer. Simultaneously, traditional retailers, particularly small businesses, have reached a point where they must carefully consider the importance of the online market for new opportunities (Pizzutti and Fernandes, 2010). Many traditional retailers are initially hesitant to enter the online market, partly due to the large investment in IT and partly for fear of cannibalizing existing marketing channels (Kauffman and Wang, 2008).

Therefore, the key to success in the internet business lies in how you carry out channel integration. There is a new term to define this business model, namely, online-to-offline commerce (Jang *et al.*, 2013). However, it is difficult to effectively define channel integration for a business across a wide customer purchase life cycle. This is a twofold issue. First, either virtual or physical companies are recognizing that success in the new economy will go to a new governance model with click-and-brick strategies to bridge the virtual and physical world. By thinking carefully about which aspects of a business to integrate and which to keep distinct, executives attempt to tailor the click-and-brick strategies to their own particular market (Li *et al.*, 2004; Pentina and Hasty, 2009).

Afterwards, companies are able to effectively determine the right mix structure of online and offline channels (King *et al.*, 2004). As channel coordination is rather complex in terms of the large variety of mixtures, this study attempts to simplify them by grouping them into various purchase stages in the customer purchase life cycle, that is, pre-purchase, actual-purchase, and post-purchase (Payne and Frow, 2004; Lim *et al.*, 2012). Consequently, successful hybrid businesses can benefit from the synergies of various channel coordinations in their interactions with customers, such as improved service variety (Goel and Prokopec, 2009).

Drawing on the above arguments, the objective of this study is to define a research model for effectively implementing channel coordination in the e-business. This model consists of three steps, click-and-brick strategies, channel coordination, and synergy realizations. Specifically, click-and-brick strategies are further described as a topology of three strategic options, in-house division, joint venture, and spin-off (Sengupta, 2000). Channel coordination is further clustered into three purchase stages in terms of a customer purchase life cycle, pre-purchase, purchase, and post-purchase (Steinfield *et al.*, 2002).

Many studies have literally argued for the importance of defining an organizational level of integration strategies for implementing a click-and-brick business, such as a joint venture (Gulati and Garino, 2000; Steinfield *et al.*, 2005). Other studies simply claimed the necessity of multi-channel integration in the e-marketplace and this is being increasingly used for the positive impact on e-business performance (Rosenbloom, 2007;

Pentina and Hasty, 2009). These studies are fragmental in indicating either a strategy issue or a channel integration issue. Further, the discussions for both issues tend to be relatively conceptual and inconclusive from a practitioner perspective. There is a great need to define a complete implementation model for effectively directing channel integration. Empirical data were further collected for validating the research model.

The rest of this paper is organized as follows. First, a review of literature provides the basis for defining the research model. Next, the development of hypotheses for the research model is discussed. We then describe the research design for construct measurements and sample design procedure. Further, testing of hypotheses is reported in association with discussions of the findings. Finally, this paper provides conclusions and suggestions from the indication of the results.

2. Literature review

Based on the above whole logic, Figure 1 provides a pictorial depiction of the research model. The following discusses the theoretical foundations of this model and the development of the hypotheses.

2.1 Click-and-brick strategies

The source of competitive advantage in business organizations lies in being able to create new customer value. However, due to the widespread use of the internet in business organizations in recent years, they compete in two worlds today: a virtual world and a physical world. Both business models have a number of advantages as well as drawbacks. A new locus of value creation lies in integrating the virtual and physical worlds (Van Baal and Dach, 2005; Kumar, 2010). Companies are recognizing that success in the internet era means using those who can execute the right click-and-brick strategies. That is, companies are able to tailor integration strategies to meet their products, market, and competitive situations (Bahn and Fischer, 2003; Wilson and Daniel, 2007). Specifically, as click-and-crick strategies are at a high conceptual level, supplementary supports are the fundamentals of click-and-brick strategies and important sources of value creation in the e-business. These supports, for example, contain supplementary goods and services, cross-promotion, shared technologies, and the like (Amit and Zott, 2001).

Many researchers have outlined certain options for click-and-brick strategies (Chavez *et al.*, 2000, Song and Zahedi, 2006). There is no single option that best defines a solution for any given company. Some researchers discussed the concept of discreteness-based choices for click-and-brick strategies, such as three options going from complete separation to full integration of virtual and physical assets for revenue

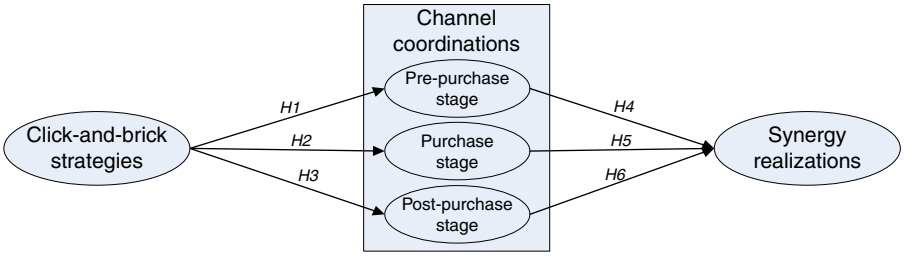


Figure 1.
Research model

propagation and enterprise governance (Sengupta, 2000; Steinfield *et al.*, 2002). These options include:

(1) separate and operate – the physical and virtual businesses are operated as two separate entities.

(2) share and operate – some key services are shared across the two businesses.

(3) joint operation – the physical and virtual units are integrated and operated jointly.

Specifically, other researchers have similarly proposed that the integration-separation decision is not an either-or choice; rather there is a continual spectrum of the degree of integration (Gulati and Garino, 2000; Steinfield *et al.*, 2005). Companies can determine their click-and-brick strategies on the basis of their own particular market and competitive situation, dramatically increasing the odds of e-business success. As a useful starting point, they further recommended examining four business dimensions, such as brand, management, operations, and equity, and further determining the degree of integration that makes sense along each dimension (Gulati and Garino, 2000). Accordingly, the click-and-brick strategies are then reported as four strategic options, spin-off, strategic partnership, joint venture, and an in-house division.

Among them, the spin-off and in-house division definitions are well understood, but the terms strategic partnership and joint venture need further elaboration. Physical and virtual businesses under strategic partnership are separately owned and operated, but both brands can be maintained and promoted in both channels. Keeping separate names while promoting the partnership accomplishes two things. It protects the trust and recognition associated with the original brand of the physical business and at the same time establishes a new brand that fits online expectations. Although physical and virtual businesses in a joint venture appear to be completely separate, they are actually tightly integrated in certain respects. The most obvious one is the shared brand.

In practice, the spin-off and strategic partnership strategies defined in the above topology are difficult to distinguish from each other in terms of the properties of separate ownership, separate operation, and separate brand. Thus, it is better to consider them as one entity for avoiding ambiguity in strategic choice. In summary of the above strategy topologies, we therefore defined click-and-brick strategies as three strategic options, spin-off, joint venture, and in-house division. Further, this study conducted an exploratory analysis to empirically determine the strategic options based on the four decision variables, brand, management, operations, and equity, while also considering a confirmation of the strategic options defined in the literature.

2.2 Channel coordination

Marketing channels in retailing can be classified into conventional and electronic channels. Traditional channels are mainly based on physical stores, such as department stores and shopping mall, where the vendors interact with the customers. Merchandise is displayed in the stores where customers can look at products, possibly try them out, purchase them, and then take them immediately. If customers encounter any problem with the products, they can easily return them to the stores, either to exchange them with other products, or to get a refund. Besides, other types of marketing channels that have also become popular include direct marketing and telemarketing. In these channels, a printed catalog or an advertisement in a magazine or on a television replaces the product display and information provision function of a store, while a telephone call center replaces the order-taking function of a sale (Kumar, 2010).

Electronic channels, as opposed to conventional channels, rely on advanced information and communication technologies to fulfill channel functions (Vrechopoulos, 2004; Pentina and Hasty, 2009). Several characteristics make the internet an attractive medium for the sale of products to consumers, such as online information access, online transaction and payment, online delivery of digital products, and opportunities for building customization (Oh *et al.*, 2012). Accordingly, a number of advantages over physical retailers can be identified: wide reach to customers, exhaustive product selection, few infrastructure requirements, unlimited opening hours, and a high degree of scalability. However, online retailers' lack of face-to-face contact with customers has several drawbacks. First, it is difficult for them to build a brand name through web sites. This is mainly because purchases on web sites lack real contact and as a result, the seller is unable to establish a trusting rapport with potential customers (Gupta *et al.*, 2004; Wu, 2013). Second, it also has the difficulty of handling the physical flow associated with virtual contact. This includes some issues such as fitting and trying out products, product delivery, and product returns. The third dilemma lies in the absence of a shopping experience comparable to traditional shopping. Finally, security issues are the important antecedents of successfully carrying out online retailing (Rowley, 2009; Luo *et al.*, 2012).

Today customers are smart, powerful, and highly informed. They are demanding every contact a company has with them leaves them more than satisfied. It is increasingly imperative to effectively integrate online and physical channels to produce the most positive customer services (Wiertz *et al.*, 2004; Wilson and Daniel, 2007). In fact, customers intend to choose different channel coordinations, depending on their various needs and preferences, across the customer purchase life cycle, pre-purchase, actual-purchase, and post-purchase (Payne and Frow, 2004; Lim *et al.*, 2012). Thus, channel coordination is better grouped based on different purchase stages, while it can provide more insight into capturing customer experience in the purchase process. Many researchers also suggested the need to understand perceived customer value and purchase intention toward channel integration in various purchase stages in the e-commerce environment (Chen and Dubinsky, 2003). Accordingly, this study attempts to group channel coordination for the three purchase stages through a comprehensive review of the literature, as reported in Table I (King *et al.*, 2004; Lim *et al.*, 2012).

2.3 Synergy realization

Hybrid retailers that successfully integrate their channels obtain synergies from an improved customer relationship and retention rate (Wagner and Lindemann, 2008). Prior research has commonly discussed relevant synergies from the right channel integration, including improved customer trust, improved customer awareness, consumer risk reduction, and coverage of diverse shopping preferences (Oh and Teo, 2010; Loukis *et al.*, 2013):

- Improved customer trust – the main impediment to e-tailing arises from consumers' lack of trust in the legitimacy of the web-based stores (King *et al.*, 2004). Specifically, consumers who recognize the web store as an extension of an existing business may perceive it to be more legitimate, and have more trust in the store.
- Improved customer awareness – before the purchase decision, a consumer may first form a consideration set for the purchase from a large number of choices.

Purchase process	Channel coordination
Pre-purchase	Use same or similar brand names in online and physical channels (Pre-purchase 1)
	Use cross-advertisement or promotion in online and physical channels (Pre-purchase 2)
	Provide identical products and prices in online and physical channels (Pre-purchase 3)
	Provide online information services in physical stores to facilitate access to a wider product range (Pre-purchase 4)
	Provide rich product information and the pre-purchase evaluation process online (Pre-purchase 5)
Actual-purchase	Order products at online stores and pick-up them at physical stores (Purchase 1)
	Provide negotiation and order tracing services online (Purchase 2)
	Order products at online stores and return for repair or additional service at physical stores (Post-purchase 1)
	Provide more choices of payment methods from online and physical stores (Purchase 3)
Post-purchase	Order products at online stores and return for repair or additional service at physical stores (Post-purchase 1)
	Offer online help or technical support for products purchased at physical stores (Post-purchase 2)
	Collect consumer information at both channels for personalized marketing and marketing research (Post-purchase 3)

Table I.
Channel coordination for the three purchase stages

The consumer keeps searching for additional choices until the expected benefits of a superior offering exceed the costs of further search (Verhagen *et al.*, 2006). If a retailer wants its products to be part of a consumer's consideration set, it should make it easier for a consumer to find them. This awareness creation not only refers to the products, but also to the retailers that offer the products.

- Consumer risk reduction – the risk associated with possible return of faulty merchandise is the major reason for the reluctance of repeating online purchase (Cooper *et al.*, 2006). A physical presence can reduce such risk by providing a low-cost method for returning flawed goods, or seeking technical assistance with a particular product.
- Coverage of diverse shopping preferences – one of the most important antecedents of satisfaction with online shopping is convenience (Steinfield *et al.*, 2002). Relationship marketing theory also indicates that consumers would like to simplify their purchase process while maintaining variety in the relationship (Paswan *et al.*, 2011). Hybrid retailers have a wider scope of choice to cover diverse preferences.

Further research also highlighted similar synergies, including cost savings, service differentiation, enhanced trust, and market extension (Payne and Frow, 2004). Other studies suggested certain performance indicators for multi-channel management, including improved service variety, improved service efficiency, increased repeat purchase, and enhanced customer profitability (Kumar and Reinartz, 2006). In addition, the synergy measures are better suited from both qualitative and quantitative perspectives (Oh *et al.*, 2012). Accordingly, this study comprehensively summarizes previous studies for defining the synergy measures, including improved customer

trust, improved customer awareness, consumer risk reduction, coverage of diverse shopping preferences, improved service efficiency, increased repeat purchase, and enhanced customer profitability.

In summary of this section, we operationalize these key constructs for providing simple and clear definitions at further helping develop relevant hypotheses and measurement items in the following sections, as indicated in Table II.

3. Hypotheses development

The following develops *H1, H2*, and *H3*. The three proposed hypotheses relate click-and-brick strategies (one variable) to channel coordination in three purchase stages (three variables). As there are three strategic options defined in the research, spin-off, joint venture, and in-house division, the examination procedure is performed in three separate statistical analyses for testing the same hypotheses.

The channel integration itself is a complex decision process associated with various determinants in combination, such as brand recognition, scope of products, order placement and delivery, and payment. In fact, multi-channel retailers use the integration in many different ways and thus their web sites offer a varying range of system functionalities. The decision process can be simplified if marketers understand what drives a customer's choice of channel activities (Kim and Ahn, 2007). It highlights some important decisions regarding the content of channel activities and focusses on defining integration strategies for properly identifying channel coordination toward customers' needs (Muller-Lankenau *et al.*, 2006). Specifically, companies should first tailor click-and-brick strategies to meet their particular market and then base it on determining appropriate channel integration (King *et al.*, 2004; Cortinas *et al.*, 2010).

Steinfield *et al.* (2002) discussed a framework for explaining an integrated click-and-brick business as the choices of channel activities in a transaction depend on three different purchase stages across the customer purchase life cycle, pre-purchase, purchase, and post-purchase. Further, this framework also shows that click-and-brick strategies are in a strong position to determine the channel coordination choices for each of the three

Construct	Operationalized definition	Relevant citation
Click-and-brick strategy	1. The extent to which a firm integrates its internet initiatives with traditional operations 2. Four dimensions for defining the construct: brand, management, operations, and equity	Sengupta (2000) and Steinfield *et al.* (2002)
Channel coordination	1. The integration of various marketing activities in online and offline channels 2. Three purchase stages for grouping the integration: pre-purchase, actual-purchase, and post-purchase	Steinfield *et al.* (2002), King *et al.* (2004) and Lim *et al.* (2012)
Synergy realization	1. The improvement of an e-business in terms of the right integration of online and offline channels 2. Major synergies: improved customer trust, improved customer awareness, consumer risk reduction, and coverage of diverse shopping preferences	Steinfield *et al.* (2002), Payne and Frow (2004) and Oh and Teo (2010)

Table II.
Operationalized definition

purchase stages. Accordingly, we propose three hypothetical relationships for the three purchase stages:

H1. Click-and-brick strategies are positively related to channel coordination in the pre-purchase stage.

H2. Click-and-brick strategies are positively related to channel coordination in the actual-purchase stage.

H3. Click-and-brick strategies are positively related to channel coordination in the post-purchase stage.

The following develops *H4, H5*, and *H6*. Many researchers have found it useful to approach e-tailing from a service-marketing perspective because the e-tailing service process heavily involves customer interaction and experience (Pizzutti and Fernandes, 2010). Thus, companies are able to enhance customer satisfaction and build stronger customer relationships by using proper channel coordination (Li *et al.*, 2004; Chea and Luo, 2010). The benefits of selecting and implementing the right channel coordination are mainly attributed to customer satisfaction in the form of enhanced services and better experience (Wiertz *et al.*, 2004; Dholakia *et al.*, 2010). Many studies specifically discussed the realized synergies relevant to the improvement of customer relationships in terms of channel integrations (Payne and Frow, 2004; Liao *et al.*, 2011). Other studies claimed that hybrid retailers may benefit from certain synergies between virtual and physical channels in their interaction with customers (Neslin and Shankar, 2009). Again, as channel coordination is defined in terms of the three purchase stages, each of them can potentially affect the synergies realization. Accordingly, we propose three hypotheses for the three purchase stages:

H4. Channel coordination in the pre-purchase stage is positively related to synergies realization.

H5. Channel coordination in the actual-purchase stage is positively related to synergies realization.

H6. Channel coordination in the post-purchase stage is positively related to synergies realization.

4. Research design

This study used a survey to collect empirical data. The questionnaire was first defined from the adaptation of an existing instrument in an English version and further, was translated to a Chinese version for the purpose of a large-sample survey. The questionnaire contains four parts. The first part uses a nominal scale, while the rest use a seven-point Likert scale.

4.1 Instrument

4.1.1 Basic information. Information was collected about organizational characteristics including industry type, annual revenue, number of employees, and experience with virtual and physical stores, as well as respondent's characteristics including education, age, working experience, and position.

4.1.2 Click-and-brick strategies. One study proposed four business dimensions, brand, management, operations, and equity, to jointly determine the degree of integration for the decision of click-and-brick strategies (Gulati and Garino, 2000).

Brand refers to the choice to integrate brands or keep them separate in a hybrid firm. Management defines whether a hybrid firm should integrate or separate its management team. Operations concern the decision of integrating operational capabilities, such as distribution and information systems, in terms of the strength of a hybrid firm and their transferability to the internet. Equity refers to the choice to own or spin-off in terms of assets or capital in a hybrid firm. Their measurement items were properly adapted from the instrument developed by Gulati and Garino (2000) for determining the strategic options. There are three items, four items, three items, and three items defined for the four dimensions, respectively.

4.1.3 Channel coordinations. Channel coordination refers to the integration of online and offline channels in an e-business. As channel coordination is complex across a purchase process, this study intends to group them in terms of three purchase stages, pre-purchase, purchase, and post-purchase (Steinfield *et al.*, 2002). Their measurement items were based on a comprehensive literature review of the three purchase stages, as reported in Table I (King *et al.*, 2004; Lim *et al.*, 2012). There are five items, three items, and three items defined for the three purchase stages, respectively.

4.1.4 Synergy realizations. Synergies refer to the improvement of an e-business in terms of the integration of online and offline channels. Their measurement items are based on a summary of relevant studies (Steinfield *et al.*, 2002; Payne and Frow, 2004), as discussed previously, including improved customer trust, improved customer awareness, consumer risk reduction, coverage of diverse shopping preferences, improved service efficiency, increased repeat purchase, and enhanced customer profitability. As a result, this part contains a total of seven items.

4.2 Sample design

Qualified sample firms were collected from various business and official directories in Taiwan. Moreover, their web sites were searched to confirm that both virtual and physical stores are present for their business operations. In addition, the products offered from the firms must be in a physical form rather than a digital form for considering the requirements of physical deliveries in this study. As a result, a study sample comprising 1,000 firms was collected from retailing and manufacturing sectors. Manufacturing firms in this survey are the firms with both production and channel activities and also qualified for examining their virtual and physical channel activities. Further, marketing managers were selected as the major respondents. This is because the main focus of this study was on understanding the improvements in customer relationships from channel integration. Accordingly, marketing managers are the managerial personnel most likely familiar with this topic. In addition, to improve survey return, a follow-up procedure was carried out with another invitation letter for the non-respondents after two to three weeks. One month later, the same invitation letter and questionnaire were sent to the non-respondents by regular mail.

Further, a pretest was conducted for the three measurement scales, click-and-brick strategies, channel coordination, and synergy realizations, by two practitioners and two academicians in the IS area, including translation, wording, structure, and content. Their comments were considered when updating the scale, to guarantee initial reliability and content validity (Hair *et al.*, 2010). After the questionnaire was finalized, a total of 800 questionnaires for each firm with a questionnaire were mailed to these marketing managers. To improve survey returns, there was a follow-up by telephone or letter after the surveys had been sent out for three weeks. A total of 203 firms replied,

with three incomplete responses deleted, resulting in a total sample of 200 firms for a 25.3 percent response rate. The seemingly low response rate raised concern about non-response bias. To check the non-response bias, the responding sample was divided into two subsamples, that is, early and late ones, including 134 and 66 respondents, respectively. The two groups were compared on various demographic characteristics for their correlations using a *t*-test, such as annual revenue and number of employees. The results indicated no systematic non-response bias for the responding sample.

In addition, common method bias results from the fact that the respondents provide the measures of the explanatory and dependent variables by a common rater (Podsakoff *et al.*, 2003). In this study, subjective measures were used for two relationship structures, click-and-brick strategy, and channel coordination as well as channel coordination and synergy realization. There is a risk of common method bias. Harman's single factor test is one of the most popular techniques to address the issue of common method variance (Podsakoff *et al.*, 2003). We included all items from all of the constructs in each relationship structure for a factor analysis to determine whether the majority of the variance could be accounted for by one general factor. The results showed that no single factor accounts for the bulk of covariance, leading to the conclusion of no common method bias.

Table III summarizes the demographics of the sample firms. Among them, the response sample indicated a small proportion of chief information officers (18 percent), chief financial officers (10 percent), and others (6 percent). As this study concerns an internet business, IT managers also play an important role in facilitating the task of this issue. Next, channel collaboration involves a large investment for an internet-based business in terms of the different degrees of integration. The amount of the investment is also the concern of chief financial officers. Accordingly, the response sample could avoid the bias from a single informant and increase the explained variances on the variables of interest. As the major respondents are at the level of senior managers, age and working experience showed a large proportion of older and more experienced respondents. The distribution of respondents' characteristics is appropriate for the research purpose.

4.3 Scale validation

As the measurement items for this scale are defined/adapted in an individual-construct manner based on a well-defined existing instruments, confirmatory factor analysis with AMOS software is appropriate for the purpose of confirming scale validation for each of all of the constructs rather than exploratory factor analysis. The measurement model was first specified to examine a goodness of model fit. As there are four sub-constructs for the construct of click-and-brick strategies, a second-order measurement model was formulated for validating the scale. There are three general groups for measuring model fit, absolute fit measures, incremental fit measures, and parsimony fit measures (Hair *et al.*, 2010). The class of incremental fit indices was used for the testing in this study, normed-fit index (NFI) greater than 0.9, Tucker-Lewis index (TLI) greater then 0.9, and comparative fit index (CFI) greater than 0.9.

Reliability was evaluated by the index of composite construct reliability. Convergent validity was assessed by three criteria, item loading (λ) is at least 0.7, composite construct reliability with a minimum of 0.8, and average variance extracted (AVE) for a construct larger than 0.5 (Henry and Stone, 1994). Discriminant validity was assessed by the measure that the square root of AVE for a construct is larger than its correlation with other constructs. The results reported a goodness of model fit with NFI (0.93), TLI (0.95), and CFI (0.93). Table IV shows the reliability, convergent validity, and

Characteristics	Frequency	%
Industry type		
Manufacturing	78	39.0
Retailing	110	55.0
Others	12	6.0
Annual revenue		
< 1,000 M	16	8.0
1,000-5,000 M	80	40.0
5,000-10,000 M	76	38.0
10,000-50,000 M	18	9.0
> 50,000 M	10	5.0
No. of employee		
< 100	20	10.0
100-500	52	26.0
500-1,000	82	41.0
1,000-5,000	26	13.0
> 5,000	20	10.0
Age		
< 30	10	5.0
30-40	50	25.0
40-50	90	45.0
> 50	50	25.0
Working experience		
< 10	26	13.0
10-20	106	53.0
> 20	68	34.0
Education level		
High school	4	2.0
College	98	49.0
Graduate college	80	40.0
PhD	18	9.0
Position		
Marketing manager	132	66.0
Chief information Officer	36	18.0
Chief financial officer	20	10.0
Others	12	6.0

Table III. Sample demographics

determinant validity. Item loadings range from 0.77 to 0.92, composite construct reliabilities range from 0.86 to 0.95, and AVEs range from 0.74 to 0.83. Each construct's square root of AVE is above its correlations with the other constructs. These results indicated both reliability and validity in a highly acceptable level.

5. Statistical analysis

5.1 Cluster analysis for strategic options

As stated above, a confirmation analysis for the pre-defined strategic options was conducted by the cluster analysis technique. Cluster analysis was implemented by combining both hierarchical and non-hierarchical procedures to group the responding

Table IV.
Reliability and validity

Construct	Item loading	Construct reliability	AVE	Correlation							
				Br	Mg	Op	Eq	Pre	Pur	Pos	Sr
Brand	0.85-0.88	0.95	0.81	*0.90*							
Management	0.81-0.83	0.88	0.75	0.28	*0.86*						
Operations	0.82-0.92	0.95	0.83	0.32	0.23	*0.91*					
Equity	0.84-0.89	0.94	0.81	0.21	0.18	0.28	*0.90*				
Pre-purchase	0.80-0.82	0.88	0.75	0.21	0.28	0.23	0.22	*0.86*			
Actual-purchase	0.81-0.85	0.90	0.77	0.19	0.24	0.31	0.31	0.28	*0.87*		
Post-purchase	0.77-0.82	0.86	0.74	0.23	0.21	−0.21	0.26	0.16	0.29	*0.86*	
Synergy realization	0.81-0.85	0.89	0.76	0.15	0.18	0.17	0.13	0.21	0.17	0.20	*0.87*

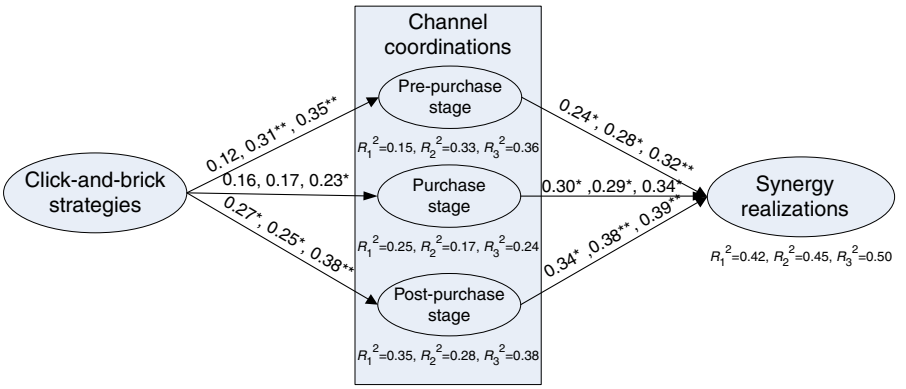
Notes: Br, Brand; Mg, Management; Op, Operations; Eq, Equity; Pre, Pre-purchase; Pur, Purchase; Pos, Post-purchase; Sr, Synergy realization. Diagonal value: square root of AVE, Non-diagonal value: correlation

firms based on the four decision variables, brand, management, operations, and equity. The hierarchical procedure with Ward's algorithm initially determined the suitable number of clusters and the non-hierarchical procedure with *K*-means further adjusted the result of the hierarchical procedure. This analysis finally confirmed a fit of a three-cluster solution with sample sizes of 61, 69, and 70 for cluster 1, 2, and 3, respectively. Cluster 1, 2, and 3 can be defined as the three distinct strategic options, namely a spin-off, joint venture, and in-house division.

5.2 Testing of hypotheses

As there are three click-and-brick strategies defined for the research model, we performed three separate analyses for the three strategic options based on the three clusters of data, with sample sizes of 61, 69, and 70. There is a problem with a small sample size for performing path analysis. PLS is a structural equation modeling technique employing a non-parametric and component-based approach for estimation purposes. PLS places minimal demands on sample size and residual distributions (Chin *et al.*, 2003). Theoretically, the sample size for performing PLS requires ten times the number of indicators, such as the second-order indicators, associated with the most complex construct or the largest number of antecedent constructs linking to an endogenous construct in the defined model. Considering the problem of sample size, PLS was thus used to analyze the research model. A structural model was specified for finding the path coefficients and variance explained for the endogenous variables (R^2). Their results were then put together to test the proposed *H1-H6* for each of the three strategic options, as indicated in Figure 2.

For the spin-off strategy, this strategy indicated a significant impact on channel coordination in the post-purchase stage and not significant in the pre-purchase and actual-purchase stages (path coefficients, 0.27 vs 0.12 and 0.16). Thus, *H3* is supported and *H1* and *H2* are not supported. This strategy explains 15, 25, and 35 percent of the variances for the pre-purchase, actual-purchase, and post-purchase stages. Further, all of the three purchase stages significantly affect the synergy realizations (path coefficients, 0.24, 0.30, and 0.34). *H4, H5*, and *H6* are supported. The three purchase



Notes: Three coefficients on each path: impact from spin-off, joint venture, and in-house division. Three R^2 under each construct: variance explained by spin-off, joint venture, and in-house division. *$p<0.05$; **$p<0.01$

Figure 2.
Result of the structural model

stages jointly explain 42 percent of the variance for synergy realizations. For the joint venture strategy, this strategy reported a significant effect on channel coordination in the pre-purchase and post-purchase stages, but not significant in the actual-purchase stage (path coefficients, 0.31 and 0.25 vs 0.17). Thus, *H1* and *H3* are supported and *H2* is not supported. This strategy explains 33, 17, and 28 percent of the variances in the pre-purchase, actual-purchase, and post-purchase stages. Further, all of the three purchase stages are significant in determining synergy realizations (path coefficients, 0.28, 0.29, and 0.38). The three purchase stages jointly explain 45 percent of the variance for synergy realizations.

For the in-house division strategy, this strategy showed a significant impact on all of the three purchase stages (path coefficients, 0.35, 0.23, and 0.38). Thus, *H1, H2*, and *H3* are all supported. This strategy explains 36, 24, and 38 percent of the variances for the pre-purchase, actual-purchase, and post-purchase stages. Further, all of the three purchase stages significantly affect synergy realizations (path coefficients, 0.32, 0.34, and 0.39). The three purchase stages jointly explain 50 percent of the variance for synergy realizations.

Specifically, to understand channel coordinations at each purchase stage varying across the three integration strategies and the effects of channel coordinations at each purchase stage on synergy realizations for the three integration strategies, a similar analysis with PLS as the previous one, which considers all the channel coordinations at each purchase stage as individual variables, was performed for each of the three integration strategies. The three testing results in terms of the two indicated purposes are put together in Table V.

First, for the pre-purchase stage, Pre-purchase 3 (offering identical products and prices in both channels) shows no significant difference across the integration strategies. This may be because this channel coordination has been commonly recognized as the basic task to build initial trust of the customers with the internet business. Thus, this channel coordination behaves not differently among the integration strategies in this stage. For the actual-purchase stage, Actual-purchase 1 (ordering products online and picking-up them offline) shows no significant difference across the integration strategies. Similarly, this channel coordination is considered the basic feature for operating click-and-brick businesses in this stage. For the post-purchase stage, Post-purchase 1 (ordering products online and returning to repair offline) shows no significant difference across the integration strategies. The reason is similar to the

Channel coordination		Coefficients for purchase stages 1	2	3	Coefficients for synergy realizations 1	2	3
Pre-purchase	1	0.12	0.18	0.30*	0.13	0.14	0.13
	2	0.16	0.17	0.29*	0.32*	0.31*	0.33*
	3	0.11	0.17	0.13	0.30*	0.28*	0.31*
	4	0.09	0.27*	0.29*	0.33*	0.32*	0.25*
	5	0.08	0.28*	0.30*	0.38**	0.37**	0.40**
Actual-purchase	1	0.11	0.13	0.13	0.30*	0.31*	0.30*
	2	0.12	0.10	0.29*	0.37**	0.32*	0.39**
	3	0.08	0.28*	0.30*	0.31*	0.29*	0.30*
Post-purchase	1	0.13	0.12	0.13	0.29*	0.30*	0.31*
	2	0.09	0.29*	0.30*	0.33*	0.35*	0.35*
	3	0.27*	0.29*	0.34**	0.39**	0.39**	0.41**

Notes: 1, spin-off; 2, joint venture; 3, in-house division. *$p < 0.05$; **$p < 0.01$

Table V.
Path coefficients for integration strategies and synergy realizations from channel coordination

previous ones. Further, while examining column 2 for the spin-off in Table IV, there is a pattern indicating that the spin-off has lower degrees of impact on channel coordination across the three purchase stages. In contrast, the in-house division creates higher degrees of impact on channel coordination across the three purchase stages. This is because the spin-off operates with two separate entities at the same time and effective channel integration would be difficult to accomplish and sometimes unnecessary in nature.

Next, the results show that the effects of channel coordination at all the three purchase stages on synergy realizations are quite similar for indicating an obvious pattern. The pattern is briefly discussed below. For the pre-purchase stage, except for Pre-purchase 1 (using the same brand names in both channels), the other channel coordinations are considered important variables in the influence of synergy realization. As discussed previously, the promotion of the original brand for most companies has been considered as the basic marketing activity, regardless of whether it is a traditional or internet business. The customers established the trust and recognized the legitimacy of the original brand for a while. Thus, its relative effect on synergy realization would not be conspicuous.

For the actual-purchase stage, the three channel coordinations significantly affect synergy realizations. Among them, Actual-purchase 2 (offering negotiation and order tracing services online) is the most influential one. This may be because the customers perceive it as a brand-new service and have used it for more frequent contact with companies both online and offline, in contrast to the limitation of the traditional business. For the post-purchase stage, the three channel coordinations are critical to synergy realizations. Among them, Post-purchase 3 (collecting information in both channels for personalized marketing) is the most important one. This is because it is considered an important antecedent of customer retention.

Besides, while the research model indicates a mediating role of channel coordination, it is necessary to test the effect of this mediation. We compared the original model against a competing model by adding an extra direct link between the click-and brick strategies and synergy realizations. PLS was used for analyzing the competing model. The R^2 for synergy realizations is 0.45, 0.49, 0.52 for spin-off, joint venture, and in-house division strategy in the competing model (Model 1), as compared to 0.42, 0.45, and 0.50 in the original model (Model 2). Accordingly, the f^2 statistic ($[R^2 - R^2_{(\text{Model 2})}]/[1-R^2_{(\text{Model 1})}]$), which is based on the difference in R^2 between the two models, was used to assess their effect size (Cohen, 1988). The f^2 statistic is computed for a value of 0.05, 0.07, 0.04 when 0.02, 0.15, and 0.35 have been suggested as the small, medium, and large effects (Chin *et al.*, 2003). Thus, their difference is non-significant. This indicates a full mediator of channel coordination in realizing synergy benefits.

6. Findings and discussions

Under the spin-off strategy, physical and virtual businesses are separately owned and operated in terms of offering different brands in the market. Channel coordination in the pre-purchases stage, such as using the same or similar brand in both channels (physical and virtual channels), may be difficult to accomplish effectively and sometimes unnecessary. In the actual-purchase stage, customer information may not be effectively integrated in a single view across both channels and many important channel coordinations, such as ordering products at online stores and picking them up at physical stores, are of a manner to require additional manual effort to connect them. This causes both the pre-purchase and actual-purchase stages to be not significant in their impacts from the spin-off strategy.

Under the joint venture strategy, physical and virtual businesses appear to be completely separate, however, they are actually tightly integrated in certain respects. The most obvious one is the shared brand. Compared to the spin-off strategy, channel coordination in the pre-purchase stage, such as using the same brand or similar brand in both channels, seem to be positively affected by the joint venture strategy. However, customer information is not well integrated in a single view in both channels. Many channel coordinations, such as providing negotiation and order tracing services online, may not be well established under the joint venture strategy. Accordingly, channel coordinations in the actual-purchase stage are presented as insignificant from the impact of the venture strategy. Under the in-house division strategy, physical and virtual businesses are completely integrated with the same owner and operated together. Some important integration aspects, such as management of the brand and customer information in both channels, would be considered in the defined in-house division strategy.

For the three strategic options, synergy realizations are all significantly influenced by the three purchase stages, such as path coefficients for the spin-off strategy in terms of the three purchase stages, 0.24, 0.30, and 0.35. Although these path coefficients are all significant for the three strategic options, the in-house strategy is the most significant for its effect on synergy realizations in terms of the three purchase stages, reporting path coefficients with 0.32, 0.34, and 0.39. Further, the in-house division strategy explains the highest variance in the synergy realizations among the three strategic options ($R^2 = 50$ percent). This may be because many important synergy realizations, particularly, related customer-based metrics, such as customer trust, customer awareness, consumer risk, improved service efficiency, and so on, are closely related to customer information with a single view in both channels. The realization of channel coordination in the post-purchase stage greatly depends on a single view of customer information in both channels. The defined in-house division strategy provides a great advantage in this customer information integration issue.

In terms of the mediator of channel coordination, the click-and-brick strategies are a conceptual guideline for defining the direction of physical and virtual businesses. Integration strategies may not impose a real effect on synergy benefits directly as there is short of a mediating role of channel coordination to implement physical and virtual businesses. Therefore, channel coordinations in the three purchase stages are significantly indicated as a full mediator to further realize synergy benefits.

7. Conclusions and suggestions

As channel coordination is critical to determine the success of e-businesses in terms of virtual and physical businesses, we propose a strategy-based research model to effectively define channel coordination and in turn, synergy performance. Existing studies do not report a solid implementation procedure in a complete manner. This is the major contribution of this research. Moreover, this empirical study reached some important findings. In general, different click-and-brick strategies have different degrees of impact on channel coordination in different purchase stages and in turn, different degrees of impact on synergy realizations. Specifically, an improvement in related customer-based synergies, such as trust, awareness, and risk reduction, is the major gain from the integration. The in-house division strategy is in a better position to provide the integration mechanism for improving the synergies as compared to the spin-off and the joint venture strategy.

The implications for practitioners are as noted below. First, the findings provide important guidance for practitioners to design effective channel coordination when adopting different integration strategies. Accordingly, this would help firms allocate limited resources effectively to focus on critical channel coordination to achieve maximal synergies. Next, when customers perceive online services as brand-new services without a face-to-face contact in their shopping process, this will usually create the need for reducing the uncertainties of the service. Synergies like initial trust and risk reduction are the major concern of the customers in online business. An understanding of the concept is useful for a firm to successfully start a new online business. In other words, other financial synergies, such as increased repeat purchase and enhanced customer profitability, would be thereafter achieved accordingly.

Further, practitioners need to carefully consider the importance of designing their coordination mechanisms among different purchase stages in the purchase life cycle. Different firms tend to place different emphases on the design of their coordination mechanism. In addition, implementing the right mix of channel coordination for click-and-brick firms allows the building of the mechanism of personalized marketing for valuable customers. Alternatively, this mechanism would increase the possibility of enhancing customer satisfaction and retention.

The implications for researchers are as follows. Channel coordination in the click-and-brick business span over inter-organizational scope and the entire customer purchase life cycle. The mechanism of channel coordination is dynamic and complex in nature. Existing theories are limited in providing insight into the principles for defining them. For example, researchers have similarly examined the concept of channel coordination in terms of considering traditional strategy topologies, such as Porter (1980)'s strategy topology and Miles and Snow's (1978) strategy topology, as guidance for understanding the channel preferences of customers (Valos *et al.*, 2010). Their findings indicate that some strategy types are important in influencing channel preferences and some are not. This study fails to further examine the synergies realized from effective channel coordination. Other researchers simply discussed the concept of harmonizing the offline and online presence to yield more opportunities in realizing synergy benefits (Steinfield *et al.*, 2002). None of them are complete in providing full information for implementing multi-channel marketing.

This study approached it from an analysis of the strategy-based perspective. Working from this perspective, this study demonstrated the capabilities of effectively reducing the complexity of defining channel coordination in virtual and physical businesses. The close link between click-and-brick strategies and channel coordination has offered extreme insight into theory building and aims to lay a theoretical foundation for future research in related areas. Next, this study proposed a comprehensive set of relationship-based synergies for the right link between the two issues. This is an important indication for researchers in defining performance metrics.

Further, subsequent research can be based on this foundation. First, this study focussed on a large sample survey for obtaining more general results. Future research can be more specific to conduct a longitudinal study of some representative firms. Second, the relationship-based synergies were defined as the main target of operating channel coordination in this study. However, the cost of integration is also an important factor for senior management to determine adoption of the integration strategies. Future research may examine the channel coordination decision from a financial perspective, such as return on investment (ROI), return on sales, and so on. Finally,

while corporate strategies are always the ultimate goal of the business, extended research may include it as the first component in this research model.

Although this study produced some interesting results, it still has some limitations. First, the response rate is a little low in this survey. This may be due to the lack of managerial experience of the respondents in the new business models. However, the response sample indicates no systematic non-response bias and is well representative of the study sample. Second, this study may have the problem of external validity for failing to consider the other characteristics of physical and virtual stores, such as the design of web stores, number of physical stores, geographic locations of physical stores, and so on. Third, although the respondents included a small proportion of chief information officers (18 percent) and chief financial officers (10 percent), this avoided the bias from a single informant and increased the explained variances on the variables of interest. Finally, digital products could be sold and delivered simultaneously on the internet network, but were restricted to this research. The findings may have some degrees of limitations as to the generalization to these types of products.

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Further reading

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Appendix. Questionnaire

Part 1. Basic information

1. Industry type: _____
2. Annual revenue (NT$ millions): □<=1000M □1000～5000M □5000～10000M □10000～50000M □>=50000M
3. Number of employees : □<=100 □100～500 □500～1000 □1000～5000 □>=5000
4. Experience: □<=10 years □10～20 years □20～30 years □>= 30 years
5. Education: □High school □College □Graduate college □Ph.D. □Other _____
6. Age: □<=30 years old □30～40 years old □40～50 years old □>=50 years old
7. Position: _____

On a scale of 1 (strongly disagree) to 7 (strongly agree), indicate the degree of the following scale items.

Part 2. Click-and-brick strategy

1. Brand
   (1) The original brand of the physical business is naturally extended to the internet business.
   (2) It is not necessary to establish a new brand that fits the online expectation in your firm.
   (3) It is not obvious to promote the shared brand in your firm.

2. Management
   (1) Current executives have the skills and experience needed to pursue the internet business.
   (2) Management of the online business is inherently part of the firm.
   (3) The internet business does not fundamentally threaten the current business model.
   (4) There is not much freedom to define the business model of the internet business.

3. Operations
   (1) Your information systems provide a solid foundation for the internet business.
   (2) Your distribution capabilities can easily translate to an internet business.
   (3) Either information systems or distribution capabilities can provide a significant competitive advantage.

4. Equity
   (1) Your firm can be in a position to capture the entire value of the internet business.
   (2) Your firm has no trouble attracting talented executives for the internet division.
   (3) Your firm does not require outside capital to fund the venture.

Part 3. Channel coordination

1. Pre-purchase stage
   (1) Your firm uses the same or similar brand names in online and physical channels.
   (2) Your firm uses cross-advertisement or promotion in online and physical channels.
   (3) Your firm provides identical products and prices in online and physical channels.
   (4) Your firm provides online information services in physical stores to facilitate access to a wider product range.
   (5) Your firm provides rich product information and pre-purchase evaluation process online.

2. Actual-purchase stage
   (1) Your firm orders products at online stores and picks up them at physical stores.
   (2) Your firm provides negotiation and order tracking services online.
   (3) Your firm provides greater choices of payment methods from online and physical stores.

3. Post-purchase stage
   (1) Your firm orders products at online stores and returns them for repair or additional services at physical stores.

(2) Your firm offers online help or technical support for products purchased at physical stores.

(3) Your firm collects consumer information at both channels for personalized marketing and marketing research

Part 4. Synergy realization

(1) Your firm improves customer trust by providing different channels for purchasing products.

(2) Your firm reduces the consumer risk of products purchased in different channels

(3) Your firm covers diverse shopping preferences for customers with different channels.

(4) Your firm improves customer awareness by cross-promoting of products in different channels.

(5) Your firm improves service efficiency for customers by providing more channels for purchasing products.

(6) Your firm attracts customers to increase repeat purchases by providing more channels.

(7) Your firm enhances customer profitability by providing more channels for purchasing products.

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