

Exploring Influential Factors on the Performance of Sales/Service Channel in the E-Commerce Context – An Empirical Study on Auto Distributors in Taiwan

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Abstract –The research on supply chain management (SCM) has been for decades the focus of the academic communities and practitioners alike. SCM depends on implementing E-Commerce (EC) as the key success factor. Distribution channel as the very end of the supply chain where customers buy market offerings including core products and supplementary services plays a crucial role in business excellence. However, little attention has been paid for the study on the antecedent consequence of performance improvement of sales/service channel in the extant body of research. Therefore, based on the outcome of literature review and field survey, we propose a conceptual model based on Levitt's insights and Chopra's framework to explore influential factors on the performance in the EC context, by taking automobile channel as the study case. Hypotheses are made to conceptualize a theoretical framework allowing the methodology of structure equation modeling (SEM) to test the theory. The objective is to identify the causal links of channel performance with constructs such as EC practice, EC environment, information technology capacity, and partner relationship management. The outcome of this study makes a contribution in shedding light on sales/service channel strategy formulation for performance improvement.

Keywords – Distribution channel power, core products and supplementary services, E-Commerce, supply chain management

I. INTRODUCTION

The research on supply chain management (SCM) has been for decades the focus of the academic communities and practitioners alike. Most research articles focus on the perspective of strategy, planning, and operations in SCM that involves different tiers of suppliers and the focal manufacturers [1] as in the automobile and the computer industries. A large body of research also concentrates in the area of trust,

coordination, and alignment among the stakeholders at each stage of the supply chain [2]. They report the practices such as just-in-time, push/pull boundary of inventory, and lean manufacturing. Research efforts on the major industry definitely provide insights into how they pursue the equilibrium between supply side and demand side in the market [3] to avoid supply risk. Thus, timely and appropriate course of market mediation by channel members including distributor or retailer is required.

A common phenomenon observed in the distribution channel of auto or computer industry in the larger part of Asian region is: multiple-level channels in both the vertical direction and the horizontal direction co-exist at the mercy of a few dominant distributors who represent either a sole brands or a couple of competing brands. It inevitably evokes the problems of channel conflict and leverage situation within the sales/service channel power regime as described in the power matrix of a research paper [4]. Channel conflict becomes aggravated in the auto industry where the physical facilities of channels manifested themselves in the form of the combination of one of the '3S' components: show room, sales office, and service shop. For a particular case, a potent regional distributor works for more than one brand to sell a car – the core product – and make a sustaining profit from subsequent periodic car maintenance or repair – the supplementary service –. Good after-sale service in turn, enhances customer satisfaction as to stimulate the repurchase intention. The channel power possessed by each party subjects to a structural imbalance to incur market mediation fighting for sufficient resources such as quota, part supply, and prompt delivery to serve the market, whereas trust and collaborative efforts seems to be less evident if compared with that of computer industry supply chain.

To pursue the optimal operations performance and profitability of their own, channel members tend to manipulate the channel power to serve the purpose. However, they have to cooperate to attain the global interest within the channel system via the EC setting by sharing the market intelligence, exchanging emergency parts or even the car model quota, and coordinating customer loyalty program. This act enables the whole channel of certain a brand to compete with that of other brand. Therefore, via the outcome of literature review and field survey, we propose a conceptual model based on Harvard University Marketing Professor Levitt's insights and

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Northwest University SCM Professor Chopra's framework to explore influential factors on the performance of automobile sales/service channel in the EC context. In this framework, we test hypotheses that the constructs such as EC context, EC practice in action, IT capability, and the implementation of partner relationship management are the antecedent of channel performance improvement. The objective is to use structure equation modeling (SEM) to explore which factor are the significant influential one for performance improvement. The contribution of this study is its providing an insight into how auto sales/service channel members in the EC environment can improve operational performance. The finding can be generalized to other industry as a guideline. The remaining part of this paper is as follows: First we present a brief literature review; next is the research methodology, results and finding. Finally we draw our conclusion.

II. LITERATURE REVIEW

Levitt observed decades years ago: "There are no such things as service industries. There are only industries whose service components are greater or less than those of other industries. Everybody is in service." [5] Indeed, the distribution channel in the automobile industry is an excellent instance that fit the category indicated by Levitt as it furnishes the supplementary service — after sales service such as maintenance and repair — to support marketing of the core product — vehicle — [6]. In the auto channel featuring '3S' components: show room, sales office, and service shop, the workers at the front end office: show room and sales office need EC support in the area of demand management and order fulfillment, whereas workers in the back end office — service shop — have to deal with complicated situation such as customer complaint about vehicle quality, warranty handling, law suit avoidance, service parts and repair parts procurement and inventory control, car accessories cross-selling, and so on. This implies that EC readiness will make more contribution in the operations of service element rather than sales element. The prevailing theory in service management domain such as role theory and self-efficacy theory cannot well explain the phenomenon of auto channel while Hirshman's theory of exit, voice, and loyalty entitles itself to delineate the customer behavior in the service encounter [7]. Therefore, improving service performance that customer values enables auto channel to retain loyal customer and acquire new customer.

Although scholar indicates that service cannot be stored [8], Chopra argues that there is 'service inventory' in place which "includes all process steps that are completed prior to customer's arrival [9]". He also argues that the level and the composition of resources is one of drivers of performance, here resources refer to the people and facilities provided by the channel firm. Among many facilities, EC context and practice play a crucial role to the performance of channel management [1][9][10]. Information technology (IT) including hardware, software, networking, communication protocol, and security measures pave the way to setup EC context [11]. It enables channel to gain customer knowledge through analysis and make decisions to improve performance. On the other hand,

experience in EC practice in turn, strengthen the organization's IT absorption capability such as 'virtual close' — close accounting records within a day [12].

Turban [13] describes B2B EC in SCM as initiatives relating to activities beyond transaction such as manufacturing, materials procurement, shipments, and logistics. B2B EC in SCM also involves coordination and collaboration. A typical consensus is that well-managed coordination and collaboration among stakeholders will lead to the implementation of partner relationship management (PRM). Chopra indicates that via PRM channel members share sales data and implement collaborative forecasting and planning (CFP) [9]. Turban also lists major infrastructure elements of EC-enabled SCM: electronic data interchange (EDI), extranets, intranets, corporate portals, work process systems and tools, and other groupware/collaborative tools [12].

It is a well-accepted notion that the construction of EC infrastructure and EC activities supported by IT improve performance in the areas of cost, quality, delivery, responsiveness, and customer service [13][14]. Based on the above-mentioned discussion and result of literature review we propose a conceptual model and use some observable indicator variables to represent a group of latent construct variables for testing the hypotheses.

III. METHODOLOGY

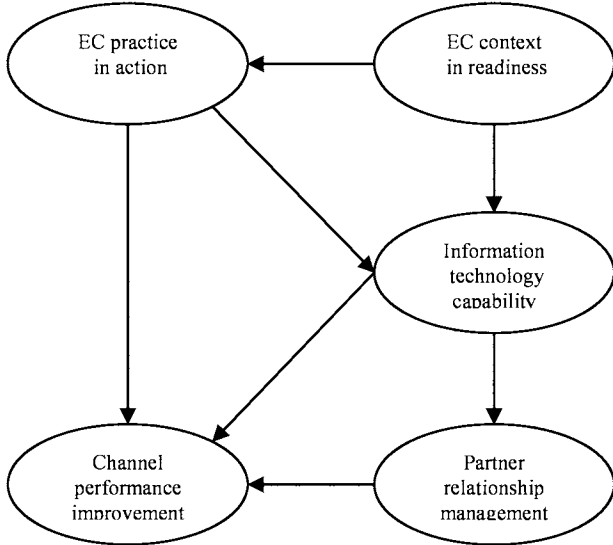
A. Research Assumption

Based on the outcome of literature review and expert interview, we set up the research question as the conceptualization framework as shown in Figure 1 in an attempt to explore the relationship between the construct 'channel performance improvement' and other four constructs: 'EC practice in action', 'EC context in readiness', 'IT capability', and 'PRM implementation'. Multiple observable indicator variables are used to infer the latent variable representing the construct. Reliability of the measurement system for indicator variables should be validated before the model fitness test. The question items are located in the appendix and we make hypotheses as follows:

- H₁: The EC context in readiness has positive influence on EC practice in action.
- H₂: The EC context in readiness has positive influence on channel's information technology capability
- H₃: The EC practice in action has positive influence on channel's information technology capability
- H₄: Channel's information technology capability has positive influence on the implementation of partner relationship management
- H₅: Channel's information technology capability has positive influence on the improvement of channel performance
- H₆: The implementation of partner relationship management has positive influence on the improvement of channel performance
- H₇: The EC practice in action has positive influence on the improvement of channel performance

B. Research structure

The path diagram for the theoretical framework is shown in Figure 1. In the meanwhile, there are corresponding indicator variables to measure the extent of perception from correspondents towards the five latent variables that cannot be directly measured. Being limited by the space allowed for the paper, the question items for the indicator variables in the abbreviated form are shown in the left side of Table I.



Note: the symbol * * * indicates p-value < 0.001

Fig. 1. The research structure

The equivalent simultaneous linear equations are shown below:

$$\eta_1 = \gamma_{11}\xi_1 + \zeta_1 \quad (1)$$

$$\eta_2 = \gamma_{21}\xi_1 + \beta_{21}\eta_1 + \zeta_2 \quad (2)$$

$$\eta_3 = \beta_{32}\eta_2 + \zeta_3 \quad (3)$$

$$\eta_4 = \beta_{43}\eta_3 + \beta_{42}\eta_2 + \beta_{41}\eta_1 + \zeta_4 \quad (4)$$

Where

η_1 is the latent variable for construct ‘EC practice in action’

η_2 is the latent variable for construct ‘channel’s technology capability’

η_3 is the latent variable for construct ‘partner relationship management implementation’

η_4 is the latent variable for construct ‘channel performance improvement’

ξ_1 : EC context in readiness

γ, β : the weight of influence factor

ζ : error terms

C. Pretest and Instrument Design

The survey instrument is developed in four steps: (1) generate question items based on literature review, (2) consult with domain experts and channel top management for the robustness of construct, contents, and operational variables, and item wording, (3) design the questionnaire for pretest and revision, and (4) collect primary data for testing the reliability of the measurement system.

The instrument is composed of two parts. The first part includes question items to measure channel employees’ perception on the seven constructs. It applies Likert’s 5-point summated scale to accommodate response ranging from ‘strongly agree’, ‘moderately agree’, ‘just agree’, ‘not agree’, to ‘strongly not agree’. The second part involves data related to the demographic and socioeconomic variables such as age, education level, and job position. The pretest applies ANOVA to see the observation differences among samples featuring these variables. Data is collected from major auto dealerships in the Taichung metropolitan region. The response rate is 80% (200 returned against 250 issued), and after data cleaning to obtain 175 effective questionnaires.

We use construct reliability (CR) and variance extracted (VE) to test the reliability of indicator variable measurement system. The preferable value for CR is greater than 0.7 and VE is greater than 0.5. The outcome of pretest justifies the reliability and validity of the survey instrument. Software package SPSS AMOS 5.0 enables us to carry out the Structural Equation Modeling (SEM) task for path analysis with latent variables.

IV. RESULTS AND FINDINGS

A. Measurement System Test

Based on the response data, we obtained all the value of CR and VE for indicator variables representing constructs like: ‘EC context in readiness’, ‘EC activities in action’, ‘technology capability’, ‘RPM implementation’, and ‘performance improvement’ are greater than 0.7 and 0.5 respectively as shown in Table I. It justifies that the reliability of the measurement system is adequate for this study.

B. Model Goodness Fitting Test

The result of goodness fitting result for SEM is shown in the Table II and SEM test outcome is shown in Fig. 2. The value of goodness of fit index (GFI) is a little bit lower than the preferred value though, the rest of indices conform to the requirement. Therefore, we assume the proposed model is appropriate to explain the causal links in this study.

The result of SEM test is shown in Fig. 2, and the goodness fitting result for SEM is shown in the Table II.

TABLE I
EVALUATION OF RELIABILITY OF THE MEASUREMENT SYSTEM

	Factor loading	CR construct reliability	VE variance extracted
EC context in readiness			
resources input	0.70	0.8446	0.5229
network in frustration	0.62		
connectivity quality	0.69		
implementation plan	0.80		
organizational adaption	0.79		
EC practice in action			
Strategy and Plan	0.5	0.8833	0.5638
business process re-engineering	0.89		
support from top management	0.78		
organization restructuring	0.84		
company-wide pervasion	0.75		
personnel training	0.65		
	0.54		
IT capability			
new technology introduction	0.64	0.8399	0.5684
versatility of application	0.73		
fusion of IT and business	0.69		
know the trend	0.78		
	0.81		
PRM implementation			
coordination	0.41	0.9022	0.6531
trust	0.89		
risk sharing	0.83		
conflict resolution	0.81		
information transparency	0.89		
	0.58		
Performance improvement			
service level	0.55	0.8905	0.622
inventory reduction	0.72		
increase	0.89		
quick response	0.86		
streamline operation	0.79		
	0.66		

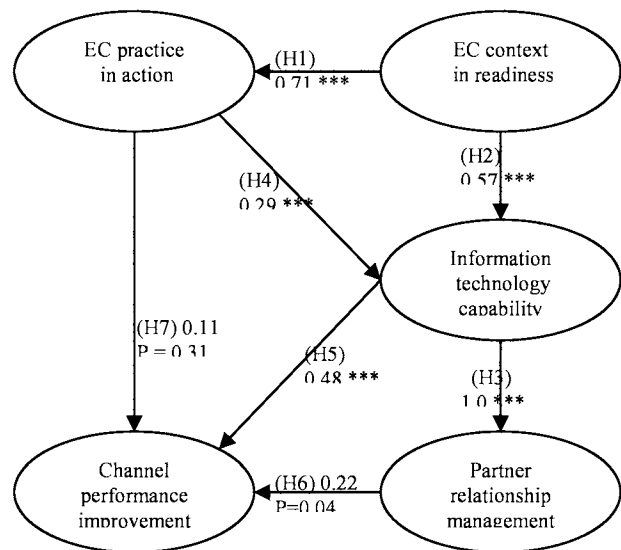
TABLE II
THE GOODNESS FITTING OF SEM MODEL

Model goodness fitting	Preferred value	Result
CMIN/DF	< 3	1.82
GFI	> 0.9	0.84*
AGFI	> 0.8	0.80
RMR	< 0.05	0.03
RMSEA	< 0.1	0.07
NFI	[0,1] and approaches 1	0.75
RFI	[0,1] and approaches 1	0.83
IFI	[0,1] and approaches 1	0.93

C. Hypotheses Test

Here we report the result of hypotheses test for H₁ till H₇ as shown in Table III. The value of coefficient of correlation between EC context in readiness and EC practice in action is 0.71 (p < 0.001) to indicate a strong positive relationship and support the hypothesis H₁; the value of coefficient of correlation between EC context in readiness and channel's information technology capability is 0.57 (p < 0.001) to indicate a positive relationship and support the hypothesis H₂; the value of coefficient of correlation between EC practice in action and channel's EC technology capability wholesaler channel power is 0.29 (p < 0.001) to indicate a weak positive relationship and support the hypothesis H₃; the value of

coefficient of correlation between information capability and the implementation of partner relationship management degree of satisfaction by retailers is 1.00 (p < 0.001) to indicate a strong positive relationship and support the hypothesis H₄; the value of coefficient of correlation between channel's information technology capability and performance improvement is 0.48 (p < 0.001) to indicate a positive relationship and support the hypothesis H₅; the value of coefficient of correlation between PRM implementation and channel performance improvement is 0.22 (p = 0.04) to indicate a weak positive relationship and support not the hypothesis H₆; the value of coefficient of correlation between EC practice in action and channel performance improvement is 0.11 (p = 0.31) to indicate a very weak positive relationship and support not the hypothesis H₇.



Note: the symbol * * * indicates p-value < 0.001

Fig. 2. The result of SEM test

TABLE III
STANDARDIZED SEM ESTIMATES

Structural links	Standard-ized Weights	P - value
H1:EC context → EC activities	0.71	***
H2:EC context → Technology capability	0.57	***
H3:EC in practice → Technology capability	0.29	***
H4:Technology capability → PRM implementation	1.00	***
H5:Technology capability → performance improvement	0.48	***
H6:PRM implementation → performance improvement	0.22	0.04
H7:EC in practice → performance improvement	0.11	0.31

*** Statistical significance at 5% level

V. CONCLUSION

Many literatures in research have been devoted to marketing channel management in the supply chain context, however, only few of them focuses on the study of the influential factors about channel performance improvement. In this study we borrow the insights of Levitt and Chopra's framework to explore the influential factors about sales/service channel performance in the auto industry. To our surprise, the

causal links between PRM implementation and performance as well as that between EC activities in action and performance have not been justified.

This paradox against the preoccupation that EC definitely increases business productivity might be an indication of research alert. How it may happen perhaps due to improper sample framing or the heterogeneity in judging the contribution of EC. On the other hand, the result of our study might demonstrate the intriguing nature of auto sales/service channel management that deserves further research.

We further analyze in details the operations of '3S' auto channel and find the situation of imbalanced dependence upon EC by different group of people. The workers in the front end office require EC support in the area of demand management and order fulfillment, whereas workers in the back end office – service shop – have to deal with complicated situation such as customer complaint about vehicle quality, warranty handling, law suit avoidance, service parts and repair parts procurement and inventory control, cross-selling car accessories, and so on. EC practice in action much benefits the service operation rather than sales office. During the phase we conducted the survey, sampling by stratification has not been taken into account for we considered all workers in an auto channel as a homogeneous group in responding the questionnaire items. Although we intended to generalize the research result, the behavior distinction in the sample frame allows the happening of a controversial research result. Concerning the unjustified causal link between PRM implementation and channel performance improvement, it unveils an important message that research on the up-stream and down-stream of a supply chain should be treated in isolation. The former involves tiers of suppliers to provide manufacturers and service provider with necessary components/services, whereas the later encompasses diversity of independent channel members that always exert the channel power each other to pursue a locally optimal objective. For instance, a potent regional auto sales/service channel may offer better service with lower price to attract customers who buy car from other channels. Because satisfying the customer is the antecedent of making a sustaining profit from subsequent car maintenance and stimulating the repurchase intention in the course of switching to other channel.

The limitation of this research work lies in its focus upon the sales/service channel of auto industry within merely a particular region. However, the contribution of this paper lies in the discovery of weighing of channel power over EC applications in the auto channel performance improvement. It opens a door to solicit more research input in the area of business relevance on the interrelationship between channel power and PRM implementation of PRM via EC setting. Study on how retailing channel members take advantage of EC infrastructure set up by the distributor and their opportunism behavior by exerting channel power to enhancing the operations performance will be the direction of further research.

APPENDIX

QUESTION ITEMS

EC context in readiness

- 1) Company commits sufficient resources to run EC
- 2) Company provide with adequate Internet, Extranet, and groupware for EC operations
- 3) The network connectivity is speedy and stable enough for EC applications
- 4) IT department takes lead in EC enforcement.
- 5) Company adapts quite well the impact of EC intervention.

EC activities in action

- 1) Company phases in infrastructure and strategic decision for EC enforcement commits sufficient resources to run EC.
- 2) Company via EC enhances operational efficiency.
- 3) Top management supervises the progress of EC implementation.
- 4) Company re-formulates business strategy to fit change management for EC introduction period.
- 5) Multiple departments in company adopt EC as a mean of management innovation.
- 6) Company offers training program to facilitate EC introduction.

IT capability

- 1) Company EC infrastructure provides functional departments with the support they need.
- 2) EC operations interlink company with external channel members to share market intelligence.
- 3) Top management directs the acquisition of IT hardware and software that meet project requirement.
- 4) Company always keeps track of the trend and development of IT related technology.

Partner relationship management

- 1) Company coordinates both up-stream and down-stream partners
- 2) High level of trust has been in place among partners.
- 3) Company and partners share the risk of change owing to EC implementation across organizational boundary.
- 4) Top management supervises the progress of EC implementation.
- 5) Company and partners keep good communication when conflict resolution is needed.
- 6) Partners are authorized to browse company's database relating to work concerning collaboration.

Performance improvement via EC

- 1) Company improves level of satisfaction towards service offered due after EC introduction..
- 2) Company cuts down service parts/materials inventory cost thanks to EC implementation.
- 3) Company increase sales revenue by attaining integration and alignment in SCM and CRM operations.
- 4) Company provides quick response toward customer demand by the support of EC context.
- 5) Company streamlines operational activities by the aid of EC infrastructure (e.g. reducing replenish lead time, reducing part lot size, product rationing based on past sales, and sharing information among different units)

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