



Journal of Applied Sciences

ISSN 1812-5654

science
alert

ANSI*net*
an open access publisher
<http://ansinet.com>

Environmental Uncertainty on Supply Chain Growth Mechanism of Action Research-based on the Supply Chain Information System Alignment and Supply Chain Integration

Fan Decheng and Hu Yu

Department of Economics and Management, Harbin Engineering University,
150001, Harbin, Heilongjiang, China

Abstract: Discusses supply chain information system alignment and supply chain integration on the mediation of the relationship of environmental uncertainty and supply chain growth, using structural equation model to empirical analysis on the related theoretical assumptions. The empirical results show that environmental uncertainty for supply chain growth has significant positive action; Supply chain information system alignment is the partial intermediary of the positive relationship of environmental uncertainty and supply chain growth; Supply chain integration is the partial intermediary of the positive relationship of environmental uncertainty and supply chain growth. Research conclusion for understanding the environment uncertainty, building supply chain information system alignment, promoting supply chain integration, achieving supply chain growth has a guiding meaning and reference value.

Key words: Environmental uncertainty, supply chain information system alignment, supply chain integration, supply chain growth, structural equation model

INTRODUCTION

Along with enhancement of the environment of market uncertainty and the intensifies of corporate globalization market competition, companies rely on their own resources reserve and management ability is very difficult to keep advantage in the fierce competition environment and seek long-term development, therefore, more and more enterprise managers begin to notice the necessity of using advanced technology and services to improve supply chain management mechanism. Scholars in recent years in view of the supply chain growth mechanism have carried out a lot of research, research field from the internal and external factors to supply chain integration and so on multi-dimensional.

Imperfect competition in the market, incomplete information acquisition and dependence on the resources in supply chain operation environment lead to environmental uncertainty is one of the important factors affect the operation of supply chain efficiency. Supply chain information system alignment is through the network or electronic data to make the information between supply chain members to systematic organic fusion, is the bridge and the link of enterprise supply chain members to instant message. Supply chain integration is through a high level of cooperation between the enterprise internal supply chain members or business

process, efficiently coordinate and manage the logistics, information flow and cash flow, provide customers with higher value products and services, enhance the enterprise competitive advantage. Integration of supply chain integration is divided into low-grade and high integration and internal integration and external integration. The internal and external integration (customer and supplier integration) are analyzed in this paper. Supply chain growth include the two aspects: through the diffusion mechanism of the products (technology and services) to meet the needs of society, through the market competition as an opportunity to grow the strength of the enterprise.

About the environment uncertainty, supply chain information system alignment, supply chain integration and the supply chain growth relations research. Gimenez and Ventura (2005) About the environment uncertainty, supply chain information system alignment, supply chain integration and the supply chain growth relations research. Li and Lin (2006) found the uncertainty of external environment was the positive role of supply chain integration. Chen and Ma (2006) studied supply chain information system alignment was contributing to the realization of networked information mechanism perfect, promoting the development of efficient operation of supply chain. Linyan *et al.* (2011) pointed out that supply chain integration from the perspective of internal

and external had a significant positive role in promoting growth. Fei *et al.* (2011) found that the external environmental uncertainty can affect supply chain integration and promote the organic development of the supply chain. Zhao (2012) studied environmental uncertainty can through the supply chain information system platform as intermediary factors influence on the mode of the supply chain innovation and organizational development.

Scholars have studied a lot of research on the relationship of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth, but the interaction of the above elements is not formed systemic conceptual model, literatures are more scarce that using empirical methods verify the relationship of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth. This study is building the role concept model of the relationship of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth, using structural equation method to verify theory assumes, the results have certain positive role and theory value for the development of enterprise supply chain members.

THEORETICAL HYPOTHESIS

There is a close relationship of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth (Fig. 1).

Environmental uncertainty, supply chain information system alignment and supply chain growth: Li and Lin (2006) in empirical study pointed out that environmental uncertainty had an important positive role on supply chain information acquisition quality, efficiency of information transmission, information sharing, the

establish with perfect of information system alignment. Therefore, put forward the hypothesis, (1) Environment uncertainty has positive and significant effect on supply chain information system alignment.

Chen and Ma (2006) Pointed out that the full range of supply chain information sharing and collaborative control helped to achieve network information feedback mechanism, through a unified information platform to promote the efficient operation of supply chain system and efficient development. Therefore, put forward the hypothesis, (2) Supply chain information system alignment has positive and significant effect on supply chain growth.

Jacobides and Billinger (2006) found the uncertainty of the supply chain environment would lead the mutual cooperation between each node enterprise, achieve the resource complementarity and the communication network building, prompt the depth development of supply chain. Therefore, put forward the hypothesis, (3) Environment uncertainty has positive and significant effect on supply chain growth.

Environmental uncertainty, supply chain integration and supply chain growth:

Li and Lin (2006) the environment uncertainty is the important influence factors of supply chain management, it can help achieve the goal of supply chain integration, as a positive effect on improving the efficiency of supply chain integration. Therefore, put forward the hypothesis, (4) Environment uncertainty has positive and significant effect on supply chain integration.

Swink *et al.* (2007) points out that the supplier integration can affect the customer preference, promote customer satisfaction, help improve enterprise's service level, improve supply chain system. Therefore, put forward the hypothesis (5) Supply chain integration has positive and significant effect on supply chain growth.

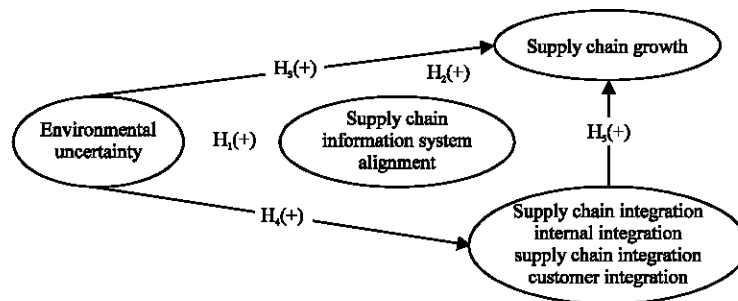


Fig. 1: Based on the supply chain information system alignment and supply chain integration as the intermediary variable in the conceptual model

Intermediation of supply chain information system alignment and supply chain integration: Lee (2000) found that the understanding of external environment uncertainty would help to realize the cooperative relationship of supply chain information system, to obtain accurate external information, promote the whole development of supply chain and the core ability of ascension of related enterprise. Therefore, put forward the hypothesis 6: Supply chain information system alignment is the intermediation variable between environmental uncertainty and supply chain growth.

Dyer and Singh (1998) pointed out that uncertain market environment can lead to complementary strategic resources within the organization, guide the related enterprise strategic cooperation, information sharing and integration of internal and external. Therefore, put forward the hypothesis, (7) Supply chain integration is the intermediation variable between environmental uncertainty and supply chain growth.

EMPIRICAL RESEARCH DESIGN AND ANALYSIS

Questionnaire analysis: Based on the Likert Five-point scale method to design and measurement the scales of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth. After test and modify, the final scale altogether consists of six subscales, a total of 26 specific item. In the issuance of questionnaires, investigation object is given priority to manufacturing companies, 323 questionnaires were issued, the final effective recovery rate was 82.35%. In this paper, based on the collection of data, using SPSS software to analysis the reliability and validity of all the variables, the findings indicate that all the variables have good reliability and validity, could able to work for subsequent analysis (Table 1).

Model validation: In this study, using the structural equation method to analysis the intermediation of supply chain information system alignment and supply chain integration to the relationship between environmental uncertainty and supply chain growth.

Based on the above theory assumes that constructing model (Fig. 2), using "t" rules for identification of structural equation model, results show that the parameters satisfy the necessary conditions of the identify model. But using AMOS 17.0 software to take parameter estimation and fitting evaluation of the structural equation model and found that, initial model existence question and need further modification.

According to AMOS 17.0 software modified index of model correction, Operations the standardized path coefficient between the variables and the estimation results of the revised model, Generally think * indicates significant level $p < 0.05$, ** indicates significant level $p < 0.01$, *** indicates significant level $p < 0.001$, Finally found the estimation results of the revised model (Table 2) and the overall fitting index of the revised structural equation model (Table 3).

The revised structural equation model has good fitting index and theoretical assumptions 1-7 all have been tested and verified. In this paper, the test results indicate that: environmental uncertainty has positive and significant effect on supply chain information system alignment, supply chain integration and supply chain growth; supply chain information system alignment and supply chain integration have positive and significant effect on supply chain growth; supply chain information system alignment is the partial intermediary variable between environmental uncertainty and supply chain growth; supply chain integration is the partial intermediary variable between environmental uncertainty and supply chain growth.

Table 1: Reliability and validity analysis

Variables	Items	Factor loading quantity	Cronbach's α	KMO value	Common factor explain variance contribution rate (%)
Environmental uncertainty	X ₁ -X ₃	[0.672,0.751]	0.722	0.834	62.395
Supply chain information system alignment	Y ₁ -Y ₃	[0.694,0.867]	0.865	0.785	61.847
Internal integration	Z ₁ -Z ₆	[0.758,0.823]	0.862	0.822	66.512
Suppliers integration	Z ₇ -Z ₁₁	[0.616,0.795]	0.859	0.816	67.433
Customer integration	Z ₁₂ -Z ₁₆	[0.711,0.884]	0.842	0.793	64.151
Supply chain growth	W ₁ -W ₄	[0.637,0.809]	0.837	0.826	69.249

Table 2: Estimation results of the revised model

Acting path	Standardized path coefficient	Significance	Hypothesis consequence
Environmental uncertainty-supply chain information system alignment	0.352	*	Support the hypothesis
Supply chain information system alignment-supply chain growth	0.216	**	Support the hypothesis
Environmental uncertainty-supply chain growth	0.437	***	Support the hypothesis
Environmental uncertainty-Supply chain integration	0.248	*	Support the hypothesis
Supply chain integration-supply chain growth	0.223	**	Support the hypothesis

Table 3: Overall fitting index of the revised structural equation model

Fitting index properties	Fitting index name	Model fitting values	Fitting successfully recommended value
Absolute fit index	Test of goodness of fit $X^2(p)$	0.106	Basic standard $p > 0.05$
	Root mean square residual(RMR)	0.028	Basic standard $p < 0.05$
	Goodness of fit index (GFI)	0.914	Basic standard $p > 0.90$
	Adjust the goodness of fit index(AGFI)	0.933	Basic standard $p > 0.90$
	Root mean square error of approximation(RMSEA)	0.041	Basic standard $p < 0.05$
Comparative fit index	Comparative fit index (CFI)	0.926	Basic standard $p > 0.90$
	Norm fit index(NFI)	0.943	Basic standard $p > 0.90$
	Tucker-Lewis index (TLI)	0.975	Basic standard $p > 0.90$
	Incremental fit index (IFI)	0.962	Basic standard $p > 0.90$
Simple fit index	Thrift adjustment index--PGFI	0.598	Basic standard $p > 0.50$
	Thrift adjustment index--PNFI	0.665	Basic standard $p > 0.50$
	Thrift adjustment index--PCFI	0.717	Basic standard $p > 0.50$

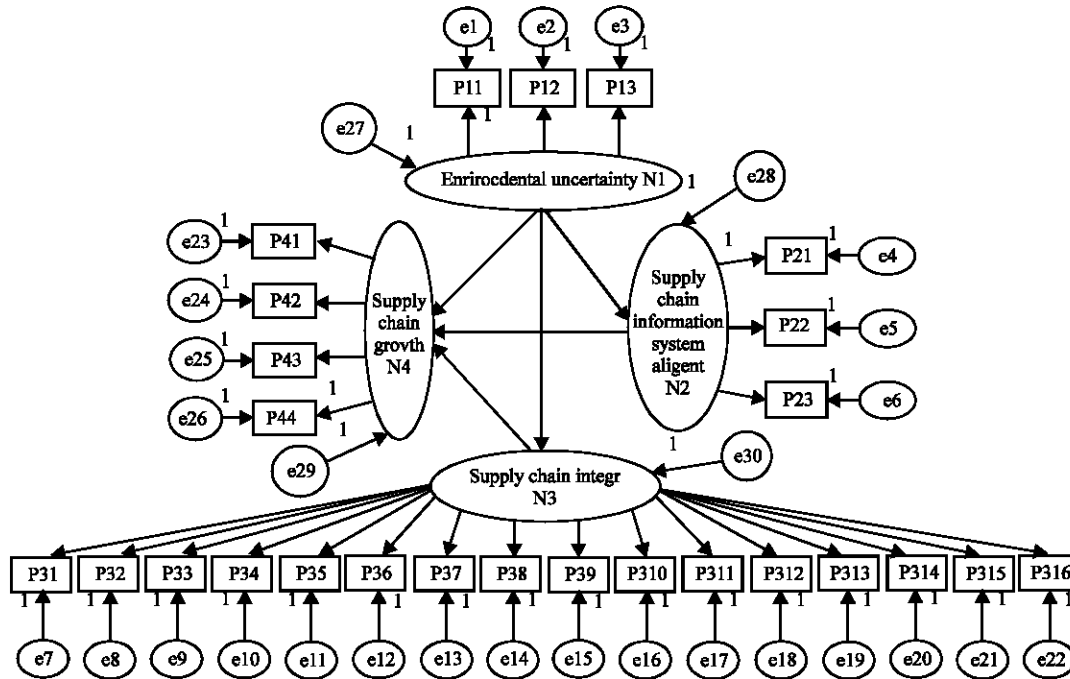


Fig. 2: Based on the supply chain information system alignment and supply chain integration as the intermediary variable in the dynamic structure equation model

CONCLUSION

Based on manufacturing enterprise as the research object, this paper use the structural equation model to explore the relationship of environmental uncertainty, supply chain information system alignment, supply chain integration and supply chain growth. Positive relationship between environmental uncertainty and supply chain growth has been verified; supply chain information system alignment and supply chain integration are partial intermediary variables of the Positive relationship between environmental uncertainty and supply chain growth has been verified. In execution of the specific activities, We should pay attention to the establishing with perfect of supply chain information system alignment and supply chain integration, undering the environment Uncertainty as the action of external force, promote the

improvement and development of related enterprises of the supply chain.

ACKNOWLEDGMENTS

This paper is sponsored by the Research Fund for the Doctoral Program of Higher Education of China (Project No.20122304110018) and MOE (Ministry of Education in China) Project of Humanities and Social Sciences (Project No.13YJA630016).

REFERENCES

Chen, J.H. and S.H. Ma, 2006. Implementable mechanisms and technical solution for supply chain integration management. *Ind. Eng. Manage.*, 1: 23-31.

- Dyer, J.H. and H. Singh, 1998. The relational view: Cooperative strategy and sources of interorganisational competitive advantage. *Acad. Manage. Rev.*, 23: 660-679.
- Fei, Y., L. Hui and J. Wu, 2011. An empirical study on the relationship among information system alignment information sharing and operational performance. *Ind. Eng. Manage.*, 16: 9-15.
- Gimenez, C. and E. Ventura, 2005. Logistics-production, logistics-marketing and external integration: Their impact on performance. *Int. J. Oper. Prod. Manage.*, 25: 20-38.
- Jacobides, M.G. and S. Billinger, 2006. Designing the boundaries of the firm: From make buy or ally to the dynamic benefits of vertical architecture. *Organ. Sci.*, 17: 249-261.
- Lee, H.L., 2000. Creating value through supply chain integration. *Supply Chain Manage. Rev.*, 4: 30-36.
- Li, S. and B. Lin, 2006. Accessing information sharing and information quality in supply chain management. *Decision Support Syst.*, 42: 1641-1656.
- Linyan, S., Li, Z., G. Li and H. Yang, 2011. The relationship between supply chain integration and firm performance for chinese manufacturers. *J. Ind. Eng./Eng. Manage.*, 3: 1-9.
- Swink, M., R. Narasimhan and C. Wang, 2007. Managing beyond the factory walls: Effects of four types of strategic integration on manufacturing plant performance. *J. Operat. Manage.*, 25: 148-164.
- Zhao, Y., 2012. Review and prospect on the supply chain integration in foreign countries. *J. Bus. Econ.*, 11: 24-32.