

A comparison of the Impacts of Lean and Agile Strategies on Improvement of Corporate Performance (Case Study: Shiraz City)

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ABSTRACT

The present research compares the impacts of lean and agile strategies on improvement of corporate performance and tries to explain performance concept considering the impacts of lean and agile strategies on improvement of corporate performance. The research design is descriptive-survey and in terms of target, it is an applied study. Simple random sampling method was used for sampling from statistical population, which included all managers and experts of food and beverage industrial companies in Shiraz City. 178 questionnaires were collected. A questionnaire containing 36 questions was used and 5-point Likert scale was used for scoring items from “very low” to “very much”.

LISREL software and structural equations model was used for data analysis. Results showed that all hypotheses were supported.

KEYWORDS: supply chain, performance, lean and agile strategies.

INTRODUCTION

In today's dynamic, complex and volatile environment companies need to design and adopt strategies which can allow them improve their performances. Companies which do not fall behind competition and adapt themselves to market conditions will be able to survive. In other words, corporate managers will see the results of their decisions and strategies in the mirror of performance criteria. Comparison of the observed performance with previous, competitors' or industry average trends provides appropriate feedback for decision-making and doing future activities. Therefore, one of the most important targets of companies over time is continuous improvement of performance. In order to improve corporate performance, selection of the best and most effective strategy has been reported as the main challenge ahead of organizations (Saimonz, 2006). Today, producing the best performance is the main concern of managers of producing companies and they try to achieve the best performance via different techniques. One of the requirements of a production company is adopting a particular kind of supply chain strategy. Such strategies stress the coordination of internal and external processes of a business so that the best service is provided for customers and final consumers and organization members are reinforced (Chicksand & Cox, 2005). Transition from different periods of product-oriented and market-oriented and emergence of post-industrial era in which knowledge and information are the main pivots of organizational movements has challenged companies and organizations. Competitive advantage belongs to organizations which emphasize on creation of value and customer satisfaction and make their processes lean. Lean approach results in reduction of final production cost and sales price. This will be followed by customer satisfaction because they will be able to buy previous products at lower prices. Since market is a connecting point of customers and companies, agile culture increases flexibility and responsiveness of companies towards customers' flexible and variable needs and even more costs in comparison with other competitors are incurred in order to implement agile strategy. An agile organization with an agile supply chain supervises its customers' demands and tries to act responsively towards their needs as quickly as possible and thereby improve its performance (Naylor, 1999). Therefore, the present research tries to find an answer to this basic question: “whether lean and agile strategies influence on performance improvement in food and beverage industrial companies in Shiraz City?”

THEORETICAL LITERATURE

Supply chain

Supply chain concept was propounded in the late 1980s and it was used widely in 1990s. Without a supply chain, marketing, distribution, design and production planning organizations would act independently. These organizations follow their targets on their own and this brings contradictions. Therefore, it is necessary to have a mechanism and integrated plan through which different tasks can be related in a chain. Supply chain management is a strategy which allows for such integration.

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In competitive markets, production companies find it necessary to have management and supervision on out-of-organization resources in addition to dealing with internal resources and issues. The reason for this is achieving competitive advantage(s) in order to attract a larger share of the market. Therefore, activities like supply and demand planning, material preparation, product programming and production, inventory, inventory control, product distribution and service providing for customers are no longer limited to a particular company and this necessitates inter-company cooperation and coordination across chain. Supply chain means aligning of economic firms and companies in order to introduce products into markets and all stages which are directly or indirectly necessary for satisfaction of customers' needs. Supply chain not only includes producers and suppliers but also it embraces all affairs concerning transportation, storage, retailers and customers. Supply chain has a network of distribution choices and facilities which hold responsibility for material procurement, conversion of the material into semi-manufactured and manufactured products and distribution of final products among customers (Jafari, 2007). Supply chain management is a philosophy which has received a lot of attention during the past few years because of increase in competition and organizational attempts for survival with emphasis on ICT advancements. The key to organizational survival is satisfaction of customers. Supply chain management not only pays attention to delivery of final product to customers but also considers a series of suppliers and investigates integration of other companies and coordination of material, finance and information flows in order to improve competitiveness of supply chain (Hicks et al, 2000). Each supply chain has its specific operational challenges. However, there is a unit model for implementation of supply chain management. Companies in each supply chain must make decisions individually and in group form considering the following 5 areas (Hoek, 2001):

1. Product: what products does target market need? What quantity of a product should be produced and when? These activities result in production program which specifies capacities, work load, quality control and equipment maintenance.
2. Inventory: what quantity of inventory should be stored in each time interval? Inventory is stored in order to reduce the effects of changes in demand but it also increases costs. Therefore, optimum level of inventory storage should be determined.
3. place: how is the layout and position of production equipment and inventory? Are the current facilities enough? Answer to these questions specifies possible products flow paths until delivery to customers.
4. transportation: how inventory is transported from one place to another? What kind of instrument is used for transportation?
5. information: information should flow in connecting points of supply chain. It must be mentioned that information transferred from inside of a chain to outside should be enough for improvement of performance and at the same time prevention from information transfer to competitors.

Lean strategy

Leanness refers to creation of a value flow in order to eliminate all wastes including time, inventory or unnecessary costs and creation of a smooth production program (Hughes et al, 2008). The main concentration of lean thinking is on elimination of all wastes. In fact, lean production means achieving better results with lesser work and cost. Lean production techniques apply well to environments in which demand is relatively stable and predictable and product variety is relatively low (Christopher & Towill, 2000). Lean production decreases human force necessary in factory, space required for production, capital spent on equipment, engineering force required for production preparation and time necessary for manufacturing new products usually by half. Furthermore, required inventory is reduced by half in lean production and products are produced with variety (Shahabi, 2008). The most important pillar of a lean production system is relationship with customers and salespeople of a lean company create a precise information system and establish relationship between factory and customers so that the factory can identify customers' needs and respond to needs appropriately. Therefore, all elements of the system in lean production are benefited desirably (gunasekaran et al, 2004).

The main elements of a lean production include: elimination of materials and wastes, continuous movement flow of parts with small volume.

In lean production system, identification and elimination of wastes in production flow chains are the main pillars of this system. In this system, a company turns back and establishes relationship with supply chain in order to achieve competitive advantage through reducing production costs and increasing production process quality. On the other hand, it moves forward and establishes relationship with customers (feizabadi, 2003). Lean distribution system tries to inspire long-term loyalty in customers and also tries not to lose even one customer. Moreover, lean production is always concerned about its market share. When sales speed is low, salespeople work more hours and when sales reduce below a specific level and factory does not have enough order for working, production employees are transferred to sales system and do their best to attract customer satisfaction. Therefore, customer is a complimentary element in production process from this viewpoint (fisher et al, 1994).

Agile strategy

Agility means utmost flexibility, such that it not only allows for changes in product, market and customers' needs but also provides opportunities for an organization to have a high rank in competition. By agile production, we mean enabling an organization to respond to continuous and unpredictable changes in competitive environments. In fact, agility origin goes back to flexible manufacturing systems (Mottaghi, 2000). Organizations face issues like rapid and unpredictable changes, environmental conditions, special orders of customers, improvement in profitability and competition. Therefore, production paradigm has undergone many changes in order to help maintain organizations situations. An agile organization uses new forms of organizing, applying human resources and technologies which optimize human resource skill and knowledge and provides an integrated and coordinated system through establishment of cohesion among three factors: human resource, technology and organization (Beamon, 1999). Successful implementation of an agile supply chain approach involves rapid and continuous responding to market changes, organizational flexibility, and attention to customers' expectations growth and organizational flexibility. This approach emphasizes mainly on rapid and unpredictable changes in market and eliminates delay time via quick transport and application of new technologies (Christopher, 2000). Agile supply chain can be considered as a structure for satisfaction of customers and employees through which any organization can design its business strategies, processes, and structure and information systems. Supply chain structure is supported by four principles:

Controlling comprehensive change and uncertainty, structures for innovation management and virtual organization, cooperative relationships, flexible and smart technologies. Gudvish believes that agility involves an organization integrating technology, employees and management with communicational infrastructure rapidly in order to respond to customers' variable needs in marketplace. Agility allows an organization to satisfy customers and possess a collection of competencies for responding appropriately to business environment changes (Yusuf, 2004).

Performance

In today's competitive world, organizations need to improve their performances and target all their attempts at achieving excellent performance. Organizations are considered as main elements in humans lives on some reasons. They provide service for society, and produce knowledge and awareness which can be the base of individual development. Considering the role of organizations in humans' lives, different dimensions of organizations like processes, systems and performances are important. Performance is considered as one of the main subjects in organizational analyses and its improvement involves measurement. Therefore, performance evaluation is necessary for organizations. Performance evaluation system was introduced and applied by Robert Aven in 1800 in Scottish textile industry in individual and organizational levels. He ranked manufactured products using wood sticks in different colors and this was actually some kind of quality o output evaluation. This method was also used in order to identify causes for changes and finally improvement of a product or provision of service. Bernadin et al believes that performance should be defined as work consequences because consequences have the strongest relationship with organizational strategic targets, customer satisfaction and economic roles. Oxford dictionary defines performance as doing, implementing, completing and abiding by a committed or ordered work. This definition refers to outputs or consequences. Therefore, performance can refer to the way organizations, groups or individuals do works (roosta et al, 2004). Brumrach believes that performance both means behaviors and consequences. Behaviors are done by individuals and performance is converted from an abstract concept into a practical concept. Behaviors are not instruments for results but are considered as consequences. (they are products of physical and mental attempts for duties) and they can be assessed and judged as separately from consequences. This definition of performance resulted in this conclusion that both inputs (behaviors) and outputs (consequences) should be considered in performance evaluation. This mode is called compound model of performance management. This model covers levels of ability or competency and successes like goal-setting and goals revision (Armstrong, 2006). Bernadin et al explained performance measurement as an activity quantification process. One of the main requirements of each performance evaluation system is presence of a clear field for performance indices in different hierarchical levels of an organization such that each of the units tries to achieve the same goals. Performance evaluation is necessary for all organizations and results in organizational excellence. Performance evaluation is the process of development and application of measurable indices which allows for systematic evaluation of pre-determined goals meeting. Performance gap is a gap between customers and shareholders' expectations and what is provided by processes and sub-processes within a framework of quality, quantity, time and product cost. Performance evaluation is the process of continuous control of the level of achieving pre-determined goals and plans (Ronaghi and EffatiDaryani, 2007). Each process is made up of activities and measures with special logical and purposeful order.

Regardless of the model which is used for performance evaluation, observation of discipline and succession and doing the following activities is essential:

- Preparation of indices and dimensions and determination of measurement unit

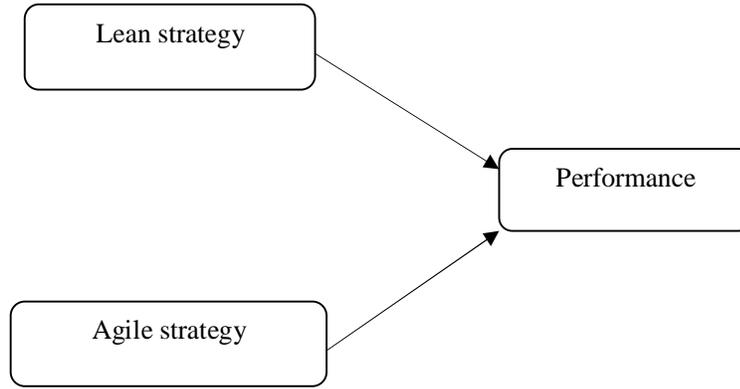
- Determination of indices weights in terms of their importance and the top scores
- Standardization and determination of desirable status of any index
- Measurement through comparison of real end-of-period performance with pre-determined standards

Research conceptual framework

After investigation of research literature, research conceptual framework (presented in figure 1) was proposed.

Research hypotheses are developed based upon the model as follows:

Figure 1: research conceptual model



H1: lean supply chain strategy has direct influence on corporate performance improvement.

H2: agile supply chain strategy has direct influence on corporate performance improvement.

H3: influence of lean supply chain strategy on corporate performance improvement is different from agile supply chain strategy.

Research methodology

The present research is an applied study in terms of its objective. It is also a descriptive survey in terms of methodology (Sarmad et al, 2009). Furthermore, data were collected in spring 2013. Statistical population of the research included all food and beverage producing companies located in Shiraz Industrial Estate. Managers and employees of the companies were selected as sample members.

Simple random sampling method was used for selection of respondents. Since population size was restricted, sample size was selected by means of limited population sampling formula with 0.05 error (Azar and Momeni, 2009):

$$n = \frac{N \cdot Z_{\alpha/2}^2 \cdot S_p^2}{E^2(N-1) + Z_{\alpha/2}^2 \cdot S_p^2} = 178$$

Sample size was calculated to be 178 but we distributed 300 questionnaires in order to be able to generalize data and acquire more information. Finally, 200 acceptable questionnaires were returned.

The questionnaire has 36 questions with 5-point Likert scale from "very low" to "very much".

Data were collected by questionnaire and data collection method was library and field study.

A pretest was conducted on 35 members of the population and Chronbach's alpha was used for investigation of reliability. Results are summarized in table 1:

Table 1: reliability and separation of questionnaire questions

Row	Variables	Number of questions	Cronbach's alpha	
			Reliability of dimensions under study	Total reliability
1	Lean strategy	16	0.884	0.936
2	Agile strategy	16	0.887	
3	Performance	4	0.725	

These numbers show that the questionnaire has an acceptable reliability.

In order to have a completely homogenous sample, the questionnaires were distributed randomly among managers and employees of the companies in two days and in different working hours. Demographic information of the respondents has been summarized in table 2.

Table 2: descriptive statistics of demographic features

variable	Valid data	frequency	Frequency percentage	Cumulative percentage
gender	female	75	42.1	44.4
	male	94	52.8	100.0
age	Below 25 years	18	10.1	10.6
	Between 25 to 35 years	43	24.2	35.9
	Between 36 to 45 years	48	27.0	64.1
	Between 46 to 55 years	36	20.2	85.3
	More than 55 years	25	14.0	100.0
education	High school degree	18	10.1	10.8
	Bachelor degree	90	50.6	65.1
	Master degree	52	29.2	96.4
	PHD	6	3.4	100.0
Organizational level	Executive manager	21	11.8	12.4
	Production manager	38	21.3	34.7
	Sales manager	33	18.5	54.1
	Marketing manager	45	25.3	80.6
	Engineer and expert	33	18.5	100.0
experience	Between 1 to 3 years	12	6.7	7.1
	Between 4 to 5 years	47	26.4	34.7
	Between 6 to 10 years	52	29.2	65.3
	More than 10 years	59	33.1	100.0

Data analysis

Structural equations modeling method was used for data analysis. This is a statistical modeling technique which embraces other techniques like multivariate regression, factor analysis, and path analysis and its main concentration is on latent variables which are defined by measurable indices and tacit variables. it is a reliable method because it analyzes relationships among variables simultaneously. In structural modeling we try to specify whether relationships existing among latent features are supported considering the collected data or not. LISREL software was used for doing calculations of structural equations modeling. Fitness of model is an important point which should be considered. This is observable in the final output of LISREL via fit indices. Fit indices for the present research model have been summarized in table 3.

Table 2: model fit indices

Indices	Allowable range	Calculated numbers
Ratio of kai-squared over df	$\chi^2 / df < 3$	2.27
P value	P value < 0.05	0.000
RMSEA	≤ 0 & $\leq 0/1$	0.085
Goodness of fit index(GFI)	$0 \leq$ & $\leq 0/1$	0.90
Comparative GFI	$0 \leq$ & $\leq 0/1$	0.94
Normalized GFI	$0 \leq$ & $\leq 0/1$	0.90

As it can be seen in table 2, all indices are in allowable range (ratio of Kai-squared over df is equal to 2.27, P value is equal to 0.000, RMSEA is equal to 0.085, and fit index is equal to 0.90, comparative fit index is equal to 0.94 and normalized fit index is equal to 0.90). therefore, the model is fit for calculations. in order to investigate research hypotheses, results of LISREL calculations were used in two states: standard state (figure 2) and significance state (figure 3).

Figure 2 in standard state

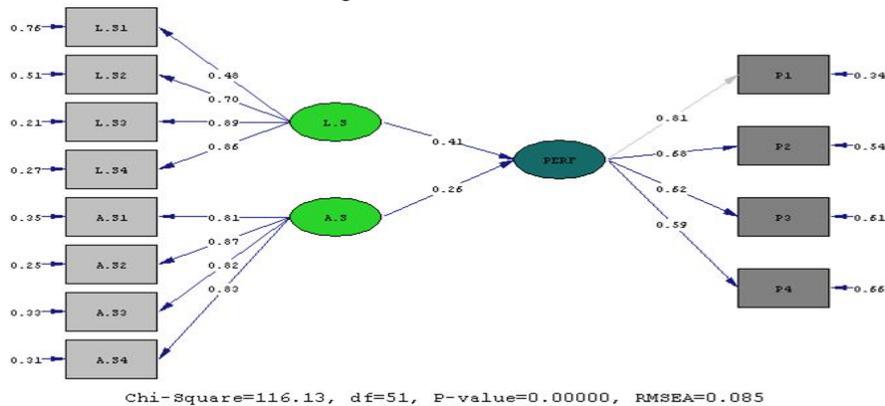
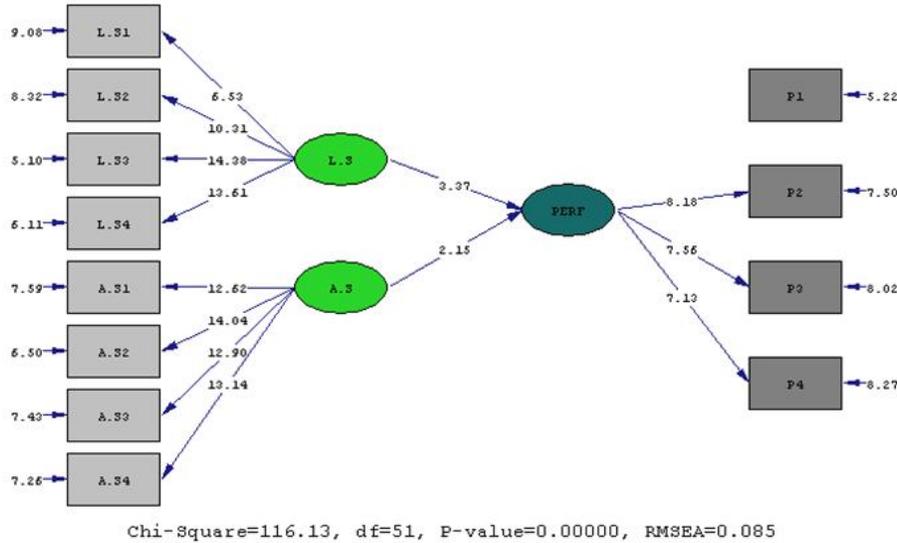


Figure 3. research model in significance state



Considering the fact that certainty level was assumed (0.95) for testing the hypotheses, all hypotheses the significance numbers of which lay outside (-1.96, +1.96) interval are supported. In the next sentences we investigate research hypotheses considering research model in significance and standard states.

H1: lean supply chain strategy has direct impact on improvement of corporate performance.

Results show that lean supply chain strategy (with standard factor loading equal to 0.41 and $t=3.37$) influences corporate performance improvement, and this supports the first hypothesis. In other words, as lean strategy is used more in supply chain, corporate performance will be improved.

H2: agile supply chain strategy has a direct impact on corporate performance improvement.

Results show that agile supply chain strategy (with standard factor loading equal to 0.26 and $t=2.15$) influences corporate performance improvement, and this supports the second hypothesis. In other words, as agile strategy is used more in supply chain, corporate performance will be improved.

H3: influence of lean supply chain strategy on corporate performance improvement is different from agile supply chain strategy.

Results show that influences of lean and agile supply chain strategies are in 0.001 significance level and $t=3.523$. This supports the third hypothesis. In other words, there is no significant difference between lean and agile strategies impacts on performance.

Conclusion and recommendations

Within the past few years, supply chain strategies selection has received a lot of attention but finding a good strategy is a difficult decision due to complex and non-structured nature of decisions. Today, companies' competition has been replaced by supply chains competition. Therefore, performance evaluation has become more and more important. Many qualitative and quantitative variables like cost, flexibility, responding speed and so on should be considered for calculation and determination of the best supply chain strategy. In other words, both lean and agile strategies can be used considering different conditions and production systems. Supply chain performance improvement methods and ideas have been designed for coordination of supply and demand and lead to reduction of costs and improvement of customers' satisfaction level. According to research results, we found that both agile and lean strategies have significant impact on improvement of organizational performance. Since no significant difference was observed between the two strategies, companies can implement each strategy depending on environmental and organizational conditions. (Lean) therefore, we advise to corporate managers to use techniques which allow for rapid product design and response to customers' needs. Companies can prepare and implement total quality management (TQM) system and use techniques like cost reduction through identification and elimination of unnecessary activities, time management and knowledge management in order to improve their performances. Further, asking suppliers' ideas about communications and sharing important information can also help improve organizational performance. (Agile) the companies can also manage product or information flow or any other resources like energy or human between production point and consumption point and improve supply chain members' performance. The food and beverage producing companies should provide a rapid delivery operation and minimize delivery time so that no additional costs are incurred. Moreover, companies which use agile strategies should have necessary flexibility in their processes in order to change products quickly corresponding to customers' needs.

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