



Providing a conceptual model for determining the interaction between supply chain strategies and product nature based fisher model (case study)

Alireza Irajpour, Amin Akafpour*

Islamic Azad University, Qazvin Branch, Department of Management, Qazvin, Iran

*Corresponding author: a.akafpour@qiau.ac.ir

ABSTRACT: In recent years, it has become widely accepted that optimal supply chain strategy depends on the nature of product. Extant research also suggests that supply chain strategies must be matched with product characteristics in order for firms to achieve better performance. The main tools of data collection instrument used was a questionnaire which was distributed to a total sample of 58 semi to senior managers are classified by job functions are corporate executive, purchasing, manufacturing /production, distribution/logistic, planning department of 4 Iranians manufacturing firms. Sample selection was based on convenience sampling. The analyses involved statistical methods such as reliability and validity tests and One-Sample t-Test. The finding showed that supply chain strategies have a significant relationship with product nature statically. For functional products, where demand is predictable and stable over time, a lean supply chain is suitable, while for hybrid products a league supply chain is more appropriate. In addition, present a native conceptual model to the case company's that shows the relationships clearly.

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Introduction

In the recent decade, the management of the supply chain has been gone out of the auxiliary, assisting and unnoticeable state and converted into a known strategic element which can has a positive and sensible effect on the activities of the organizations (akhshabi, 2012).

Today's competition is not between autonomous business entities, but between integrated supply chains (Lambert and Cooper, 2000). Therefore, supply chain management has received increasing attention from practitioners and academia. Effectively managing the flow of materials from supply sources to the ultimate customer represents a major challenge for today's managers (Mabert and Venkataramanan, 1998). Thus, firms need to possess a clear strategic planning in order to effectively organize such complicated activities, resources, communications, and processes. Research on supply chain strategy is closely linked with product characteristics. For example, (Fisher, 1997) and (Christopher and Towill, 2000) posit that supply chain strategies must match with product characteristics, competitive strategies, and the environment in order for them to be effective. Companies are struggling to improve not only their manufacturing operations but also their supply chain

operations, recognizing the increasing importance of finding the best process and supply chain for their products.

The objective of supply chain is to maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer's request (Golrizgashti et al, 2012).

The competitive environment needs that companies supply upward quality products and services, deliver quick service response and improve dynamic capabilities that are in tune with the growing changing business environment (Zarenezhad et al., 2012). In the many manufacturing companies suggests that an effective supply chain has to be designed with respect to the product that is going to be supplied through the chain, and needs tools to match the supply chain to their product lines.

The foundation for Fisher's theory is that products can be either functional or innovative depending on their demand pattern and market expectations. A functional product is assumed to require a physical efficient supply chain, whereas an innovative product would require a market-responsive supply chain (Sayuti, 2011). Another perspective on alternative supply chain designs is the distinction

between lean and agile supply chains (Naylor, 1999), where a lean supply chain is physically efficient, using Fisher’s terminology, and an agile supply chain has similar characteristics as the market-responsive in Fisher’s model.

The purpose of this study is to develop a native framework by using Fisher’s model as the framework, for deciding what supply chain strategy should be used for different products nature. This study also investigates supply chain strategies for standard and hybrid products. The study is structured as follows. First, review and comment upon the model by (Fisher,1997). Next, Relevant literature is reviewed and synthesized first to develop a conceptual model, followed by a description of research methodology. The analytical results are then presented along with discussion. Conclusion and implication are discussed finally.

Literature review

Fisher’s model: review and comments

Supply chain includes a network of facilities and distribution methods which its role is preparing material, transportation of raw material, finished goods, and delivering this product to the customers (sheikh, 2012).

Several authors have proposed alternative supply chain focused frameworks for the strategic alignment of products with specific types of supply chains based on their demand and supply characteristics. One of the most influential and often cited frameworks was proposed by(Fisher,1997). who separated products into either functional or innovative

categories based on their degree of demand uncertainty, their profit margin levels, and product mix. Functional products are typically characterized by low profit margins, low product variety, and high volumes, whereas the exact opposite is true for innovative products as illustrated in Figure1(Stavrulaki and Davis, 2010).

Based on Fisher’s model, there are two main strategies to manage the supply chain: efficiency and responsiveness. The primary purpose of an efficient supply chain is to provide the lowest price to the customers, while a market-responsive SC aims to respond quickly to the customers’ demand (a detailed comparison of these two types of product whit relation strategies are presented in Table 1).Several authors have subsequently discussed and expanded Fisher’s framework. In addition to categorizing products as functional or innovative (Lamming et al, 2000) included the dimension of product complexity in their framework) included the dimension of a product’s replenishment lead time and contrasted lean, leagile (hybrid), and agile supply chains.(Huang et al, 2002), (Lummus et al, 2006) also characterized products and supply chains based on leanness and agility. (Lee, 2002) also expanded Fisher’s framework by incorporating not only demand uncertainties but also supply uncertainties in his proposed framework, stating that the supply process can be either stable or evolving (unstable) for both functional and innovative products. This suggests four different types of supply chains: efficiency, risk hedging, responsiveness, and agile strategies. (Chaharsooghi and Heydari, 2011).

Table 1: Matching supply chain strategy with product nature

Supply chain strategy	Responsive supply chain	Mismatch	Match
	Efficient supply chain	Match	Mismatch
		Standard product	Innovative product
		Product type	

Table 2: Characteristics for functional versus innovative product types and physically efficient versus market-responsive supply chains (Fisher, 1997)

Product aspects	Functional	Innovative
Product life cycle	More than two years	Three to 12 months
Contribution margin	5-20 percent	20-60 percent
Product variety	Low (10-20 variants per category)	High (often millions of variants per category)
Average margin of error in the forecast	10 percent	40-100 percent
Average stock-out rate	1-2 percent	10-40 percent
Average forced end-of-season markdown as percentage of full price	0 percent	10-25 percent
Lead time required for made-to-order products	Six months to one year	One day to two weeks
Supply chain design aspects	Physically efficient process	Market-responsive process
Primary purpose	Supply predictable demand efficiently at the lowest possible cost	Respond quickly to unpredictable demand in order to minimize stock-outs
Manufacturing focus	Maintain high average utilization rate	Deploy excess buffer capacity
Inventory strategy	Generate high turns and minimize inventory throughout the chain	Deploy significant buffer stocks of parts or finished goods
Lead-time focus	Shorten lead time as long as it does not increase cost	Invest aggressively in ways to reduce lead time
Approach to choosing suppliers	Select primarily for cost and quality	Select primarily for speed, flexibility and quality
Product-design strategy	Maximize performance and minimize cost	Use modular design in order to postpone product differentiation

Fisher's model: review and comments

Several authors have subsequently discussed and expanded Fisher's framework. In addition to categorizing products as functional or innovative, (Lamming et al,2000) included the dimension of product complexity in their framework. included the dimension of a product's replenishment lead time and contrasted lean, leagile (hybrid), and agile supply chains. (Huang et al,2002),(Lummus et al,2006)also characterized products and supply chains based on leanness and agility.

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Testing of Fisher's model

Four other studies (Li and O'Brien, 2001; Selldin and Olhager, 2007; Wong et al., 2006; Yinan Qi,2009) have attempted to test Fisher's model with varying methodologies(M. Lo and Power,2010). The first(Li and O'Brien,2001) have carried out a quantitative analysis to match product types to supply chains; they modeled three alternative supply chain strategies, each of which represented a different level of responsiveness. The results mainly support Fisher's idea that when demand uncertainty is low, the physically responsive process is the correct choice, and when demand uncertainty increases, the other two strategies, having more responsiveness, achieve better performance. However, in the case when demand uncertainty is high and value-adding capacity is low, the make-to-order strategy performed best; that differs from Fisher's results.(Kaipia and Holmström,2010)

(Wong et al,2006) conducted a case study by using (Fisher's,1997) model as the backbone. This research focuses on how product characteristics affect

the responsiveness of the toy supply chain. In this research, four characteristics (forecast uncertainty, demand variability, contribution margin, and time window of delivery) were used. As the result of this study, an extension of (Fisher's, 1997) model was proposed. These authors suggest that products can be classified into five different types (functional, innovative, suicide, dream, and Intermediate) by two dimensions (forecast uncertainty and contribution margin). Each of the product types is suitable for physically efficient, market responsive, make to order, physically responsive, and physically responsive supply chain strategies respectively.

Selldin and Olhager survey 128 Swedish manufacturing companies and then map their fit between product characteristics and supply chain design on a scatter diagram. (Selldin and Olhager, 2007) perform statistical analyses on the data and find that the companies with responsive supply chains use them for both functional and innovative products, and that companies with innovative products use both responsive and efficient supply chains for these products. Specifically, they find that the combination of functional products with efficient supply chains, and vice versa, is statistically significant at the 0.01 level, while the combinations involving innovative products and responsive supply chains are not, indicating that fewer companies with innovative products match the responsive supply chain to these products compared to companies with functional products using an efficient supply chain.

K. Boyer, and Zhao investigates supply chain strategies and empirically test the supply chain strategy model that posits lean, agile, and lean/agile approaches using data collected from 604 manufacturing firms in China. this research shows that manufacturers in China can be classified into four strategic groups: lean, agile, lean/agile, and traditional. Results of a cluster analysis indicate that a firm's product characteristics match well the supply chain strategy predicted by existing typologies. In particular, a lean strategy is associated with very low values for innovative products while an agile strategy is marked by much higher values for innovative products. These results provide support for the product characteristics/supply chain strategy matrix.

Manufacturing paradigms: lean, agile and leagile

A lean supply chain is a strategy that produces just what and how much is needed, when it is needed, and where it is needed. Lean is a supply chain term defined.

as the "enhancement of value by the elimination of waste" (Womack and Jones, 2003). Agility is defined as "using market knowledge to

create more value and profit in a rapidly changing market" (Naylor et al, 1999). In contrast, lean thinking is about eliminating all waste throughout the system, including cost and time wastes (Womack and Jones, 1994). Essentially, the agile strategy is implemented where demand is volatile, and the lean strategy is suitable when demand is stable. The agile or lean strategies considered in isolation do not necessarily result in the best strategy (Mason-jones et al, 2000). Agility and leanness can be combined within one supply chain to meet customer demand, which is called "Leagility" (Naylor et al, 1999). Leagility is defined as the combination of lean and agile strategies within a supply chain by determining a decoupling point. The decoupling point defines where the chain must be agile and where it must be lean. Members of the supply chain upstream of the decoupling point should focus on leanness, while the downstream members should be agile. (Chaharsooghi and Heydari, 2011).

The model for determine product type (Samuel, Huang, 2002):

In this quantitative model 15 questions to be answered to determine the type of product. And each indicator is rated from 1 to 10. Questions are divided into three levels. First-level questions (very important) that corresponds to Main product characteristic, The second level of questions (nearly important) is related to First-level questions, These questions reflect some aspects of first-level questions are answered. The third level of questions (important) is designed according the previous question.

First-level questions (very important)

- 1) If product demand is predictable?
- 2) What is the primary purpose of the process?
- 3) if competition, is constant or not?
- 4) Whether the customer needs is constant or unchanged.
- 5) How long product life cycle

Second-level questions (nearly important)

- 1) How long is Lead time for make-to-order products?
- 2) whether expertise and knowledge of human resources is critical?
- 3) the delivery speed is critical or not?
- 4) What is the rate of delayed orders?
- 5) How much is the forecasting errors?
- 6) If introduction of new product and its availability is essential or desirable?
- 7) If The total operation time is critical or not?
- 8) If product manufacturing process is focused on high rates of Applying equipments or the Additional capacity?

Third-level questions (important)

- 1) How much is Contribution margin?
- 2) How much is Product variety?

According the tree levels question we design quantitative

S=Total Score

$$S = \sum_{i=1}^3 \sum_{j=1}^{N_i} W_i V(x_{ij})$$

i=Question Level 1,2,3

N1 = 5, N2 = 8, N3 = 2;

Wi: Question Weight for i level w1 = 3, w2 = 2, w3 = 1

Xij=j th Question For i th Level j = 1,2,...,N

V(Xij)= scores assigned to Xij Question

It has been proved experimentally If S is less than 99 then Type of product is standard and If S is Between 99to 198 then Type of product is Hybrid.

Also If S is greater than 198 then Type of product is innovative.

Research model and hypotheses

Literature review and typologies comparison lead to extract conceptual research model (Table 3). This Research model is not exactly based on fisher typology. The reasons why(Fisher’s,1997) model is not supported could be followed. First, Fisher’s argument of separating products into two groups appears to be changed and hybrid product to be appeared. second, the features of the two supply chain strategies proposed by (Fisher,1997) seem to have changed in the past decade. The league strategy combining both efficiency and responsiveness is possibly found in the real

Business circumstance.

Table 3: summarizes the research model underlying this study.

Supply chain strategy	Agile supply chain (responsive)	Mismatch(H1)	After decoupling point (match)
	Lean supply chain (efficient)	Match(H1)	Before decoupling point)match)
		Standard product	hybrid product
			Product type

As shown in the left portion of figure2 supply chain strategy in this research model is divided into responsive and efficient supply chain, Also as shown in the bottom portion of figure2 product type in this research model is divided into Standard and hybrid product.

This matrix includes four quadrants. In the lower left and upper left quadrant of the framework the manufacturers of standard product choose a physically efficient (Lean) supply chain as opposed to a market-responsive (Agile) supply chain. For verification this tow quadrant H1 Hypothesis is presented. The expected relationship between supply chain strategy and Standard product leads to the H1 hypotheses.

H1. Companies with functional products choose a physically efficient (Lean) supply chain as opposed to a market-responsive (Agile) supply chain.

As shown in the lower Right quadrant of the research model, manufacturers of hybrid product apply Lean supply chain at supply side before decoupling point. The expected relationship between supply chain

strategy and hybrid product at supply side before decoupling point leads to the H2 hypotheses.

H2. Companies with hybrid product choose a physically efficient (Lean) supply chain at supply side Before decoupling point as opposed to a market-responsive (Agile) supply chain.

As shown in the upper Right quadrant of the research model manufacturers of hybrid product apply market-responsive (Agile) supply chain at Demand side after decoupling point. The expected relationship between supply chain strategy and hybrid product at supply side after decoupling point leads to the H3 hypotheses.

H3. Companies with hybrid product choose market-responsive (Agile) supply chain at Demand side after decoupling point as opposed to physically efficient (Lean) supply chain.

Methodology

Sample and data collection

Since the purpose of this research was to collect quantitative data to investigate the relationship between product nature and supply chain strategy, a

survey-based questionnaire method was used. A total of 58 copies of the questionnaires was distributed to experts and semi to senior level manager, of four successful manufacturing company named, Kermanshah tire cord, Pakshoo Co and Tolypers Co and Taj Co.

To answer the questionnaire, the respondents were required to have an understanding of their major product family, which is specified in the survey as the product or product group. In addition, respondents are also required to have knowledge of their supply chain strategy. Thus, experts and semi to senior level manager holding a strategic position in the firm was determined to be the key informant. The questionnaire was composed of three parts: product characteristics, and supply chain strategy, firm performance. Questions relating to supply chain strategy were developed directly from Fisher's definitions of their respective determining characteristics. Questions

relating to product characteristics developed directly from presented model by (Samuel and Huang, 2002). More specifically in Samuel and Huang if the scores of product characteristics in the model were less than 99, products is classified in the standard product. If the scores of product characteristics in the model were between 99 to 198, products is classified in Hybrid products, also if the scores of product characteristics in the model were more than 198, products is classified in innovative products. In terms of supply chain strategy, a total of 14 survey questions was extracted from Fisher's statements on supply chain strategy. Each question was measured using five-point Likert scales (1 = not important at all: 5 = very important).

The Cronbach's alpha values for the efficiency-based and responsiveness-based groups in Kermanshah tire cord, Pakshoo Co and Tolypers Co and Taj Co are according table II. Alpha values higher than 0.7 show that reliability is acceptable.

Table 2: Reliability analysis of questionnaires to determine the type of supply chain strategy with Cronbach's alpha test

kermanshah tirecord		Pakshoo co		Tolypers co		taj co	
Reliability Statistics		Reliability Statistics		Reliability Statistics		Reliability Statistics	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
0.802	14	0.788	14	0.796	14	0.880	14

the mean values of the efficiency and responsiveness-based strategies were calculated. If the mean value was greater than three (which indicates the willingness of pursuing a particular strategy was higher than the average level), the respondent was identified as having a high intention of pursuing the corresponding strategy (a cut off point of three was set in this study because a five-point Likert scale was utilised in this survey and three was taken to be the expected" value for the pursuit of a particular strategy). If the mean value was less than or equal to three, the respondent was identified as not regarding that particular strategy to be important to the organisation. Thus, four possible categories. In this case use One-Sample t-Test to test whether population is significantly differ from some hypothesized value (3 for this research).

Operational measures of products

In terms of determining product type, a total of 15 survey questions was extracted from model presented by Samuel and Huang. Each question was measured using five-point Likert scales (1 = not important at all: 5 = very important).

Whatever the number is closer to one, the product is closer to standard product and whatever the number is closer to five, the product is closer to innovative product. According to the model Each question has 10 scores and each question in five-point Likert scales is multiplied by tow. According to data collecting and data analysis in table III the average scores in detergent companies include Pakshoo co and Tolypers co and taj co is between 99 to 198, thus this products classified into hybrid products. Also according the scores tire cord product is classified into standard products.

Table 3: A comparative table of final results and scores to determine the type of product in the detergent industry, tire yarn

Attributes	tire yarn	detergent industry
First-level questions (very important)		
Ability to demand forecast	2	2.3
primary purpose of the process	1	2.3
Change value of market competition	1	3
customer needs Changes	2	2.3
product life cycle	1	1.3
Total scores of First-level questions in five-point Likert scales	7	11.3
Total scores of First-level questions in model	42	68
second-level questions (nearly important)		
Applying Lead time for make-to-order product	3	4.3
Importance of expertise and knowledge of human resources	3	3
delivery speed	1	4.3
the rate of delayed order	1	3.3
Average margin of error in the forecast at the time production	1	2
Product introduction time	2	3.3
total operation time	1	2
rates of Applying equipments or the Additional capacity	1	3.7
Total scores of second-level questions in five-point Likert scales	13	26
Total scores of second -level questions in model	52	104
Third-level questions (important)		
Contribution margin	2	3
Product variety	1	5
Total scores of third-level questions in five-point Likert scales	3	8
Total scores of third -level questions in model	3	8
Total scores of all questions in model	97	180

Operational measures of supply chains

A one-sample t-test is used to test whether a population mean is significantly different from some hypothesized value. In this test if P-value is greater than 0.05, variable has no significant difference with test value (ie, number 3). Also if P-value is less than 0.05 variable has significant difference with test value (ie, number 3). In this case If the average of each index is greater than 3, the factor is strongly exists in the statistical society. The main hypothesis 1 has 14 sub-hypotheses, All these assumptions is tested for standard products. We test this hypothesis in tire yarn industry because tire yarn is classified in standard products. all hypothesis and sub hypotheses is shown below:

main hypothesis 1: Companies with functional products choose a physically efficient(Lean) supply chain as opposed to a market-responsive(Agile) supply chain.

H1-1: in standard product, primary purpose in dealings with partners is pursuing lowest total cost

H1-2: in standard product, primary purpose in dealings with partners is focused on Current and reducing waste whit increasing production.

H1-3: in standard product, manufacturing focus/inventory strategy in dealings with partners is maintaining high average utilisation rate and minimising inventory throughout the chain.

H1-4: in standard product, lead-time focus in dealings with partners is shortening delivery lead-time as long as it does not increase cost.

H1-5: in standard product, product design Strategy, manufacturing products with low cost and maximum performance.

H1-6: in standard product, approach to choosing suppliers is primarily based on their cost and quality.

H1-7: in standard product, Production planning is order-based approach and relies on forecasting and long-term planning.

H1-8: in standard product, primary purpose in dealings with partners is responding quickly to meet unpredictable demands.

H1-9: in standard product, primary purpose in dealings with partners To produce new products and make innovative products, or improving the nature or design of current products.

H1-10: in standard product, manufacturing focus/inventory strategy in dealings with partners is developing significant buffer stocks of parts or finished goods.

H1-11: in standard product, lead-time focus in dealings with partners is investing aggressively in ways to reduce delivery lead-time irrespective of cost.

H1-12: in standard product, product-design strategy is using modular design

H1-13: in standard product, Approach to supplier selection, is based on flexibility, delivery Speed, and diversity in size and product type.

H1-14: in standard product, Production planning approach based on quick response to needs, also it has a short-term program.

All sub-hypotheses related to lean supply chain is approved, Mean Difference of Supply chain strategy attribute value minus three for H1-1 to H1-7 is positive and Difference of Supply chain strategy attribute value minus three for H1-8 to H1-14 is negative. That means Companies with functional products choose a physically efficient (Lean) supply chain as opposed to a market-responsive(Agile) supply chain. Therefore, the main hypothesis1 is confirmed (table 4).

Table 4: One-Sample t-Test for determining supply chain strategy whit standard products

One-Sample Test	Test Value = 3				95% Confidence Interval of the Difference		
	T	Df=(N-1)	Sig. (2tailed)	Mean Difference	Mean	Sub-Hypothesis	situation
primary purpose (Low cost)	12.2	14	.00	1.6	4.6	H1-1	validity
primary purpose (reducing waste)	16.8	14	.00	1.8	4.8	H1-2	validity
Inventory strategy (minimization)	16.8	14	.00	1.8	4.8	H1-3	validity
Lead-time focus	16	14	.00	1	4.0	H1-4	validity
design Strategy (performance)	11.5	14	.00	1.5	4.5	H1-5	validity
Suppliers whit low cost	12.2	14	.00	1.6	4.6	H1-6	validity
long-term planning.	10.6	14	.00	1.4	4.4	H1-7	validity
primary purpose	-4	14	.001	-0.5	2.4	H1-8	validity
primary purpose	-11	14	.00	-1.4	1.5	H1-9	validity
Inventory strategy (minimization)	-20.5	14	.00	-1.8	1.1	H1-10	validity
Lead-time focus (flexibility)	-3.67	14	.003	-0.6	2.4	H1-11	validity
design Strategy (performance)	-11.2	14	.00	-1.2	1.8	H1-12	validity
Flexible supplier	-7.48	14	.00	-0.8	2.2	H1-13	validity
short-term planning.	-14.6	14	.00	-1.7	1.2	H1-14	validity

The main hypothesis 2 has 7 sub-hypotheses, All these assumptions is tested for hybrid products. We test this hypothesis in detergent industry because cosmetic and health products is classified in hybrid products. all hypothesis and sub hypotheses Is shown below:

Main hypothesis2: Companies with hybrid product choose a physically efficient (Lean) supply chain at supply side Before decoupling point as opposed to a market-responsive (Agile) supply chain.

H2-1: in hybrid product, primary purpose in dealings with partners is pursuing lowest total cost.

H2-2: in hybrid product, primary purpose in dealings with partners is focused on Current and reducing waste whit increasing production.

H2-3: in hybrid product, manufacturing focus/inventory strategy in dealings with partners is maintaining high average utilisation rate and minimising inventory throughout the chain.

H2-4: in hybrid product, lead-time focus in dealings with partners is shortening delivery lead-time as long as it does not increase cost.

H2-5: in hybrid product, product design Strategy, manufacturing products with low cost and maximum performance.

H2-6: in hybrid product, approach to choosing suppliers is primarily based on their cost and quality.

H2-7: in hybrid product, Production planning is order-based approach and relies on forecasting and long-term planning.

Main hypothesis3: Companies with hybrid product choose market-responsive (Agile) supply chain at Demand side after decoupling point as opposed to physically efficient (Lean) supply chain.

H3-1: in hybrid product, primary purpose in dealings with partners is responding quickly to meet unpredictable demands

H3-2: in hybrid product, primary purpose in dealings with partners To produce new products and make innovative products, or improving the nature or design of current products.

H3-3: in hybrid product, manufacturing focus/inventory strategy in dealings with partners is developing significant buffer stocks of parts or finished goods

H3-4: in hybrid product, lead-time focus in dealings with partners is investing aggressively in ways to reduce delivery lead-time irrespective of cost

H3-5: in hybrid product, product-design strategy is using modular design

H3-6: in hybrid product, Approach to supplier selection, is based on flexibility, delivery Speed, and diversity in size and product type.

H3-7: in hybrid product, Production planning approach based on quick response to needs, also it has a short-term program.

all sub-hypotheses related to leagile supply chain is approved, Mean Difference of Supply chain strategy attribute value minus three for H2-1 to H2-7 is positive and also Difference of Supply chain strategy attribute value minus three for H3-1 to H3-6 is positive. That means Companies with hybrid product choose a physically efficient (Lean) supply chain at supply side Before decoupling point as opposed to a market-responsive (Agile) supply chain, and Companies with hybrid product choose market-responsive (Agile) supply chain at Demand side after decoupling point as opposed to physically efficient (Lean)supply chain. Therefore, the main hypothesis 2 and 3 is confirmed(Table 5).

Table 5: One-Sample t-Test for determining supply chain strategy with hybrid product

One-Sample Test	Test Value = 3				95% Confidence Interval of the Difference		
	T	Df=(N-1)	Sig. (2tailed)	Mean Difference	Mean	Sub-Hypothesis	situation
primary purpose (Low cost)	12.59	35	0.00	1.1	4.14	H2-1	validity
primary purpose (reducing waste)	9.57	35	0.00	1.1	4.19	H2-2	validity
Inventory strategy (minimising)	15.74	35	0.00	1.5	4.58	H2-3	validity
Lead-time focus	13.66	35	0.00	1.1	4.19	H2-4	validity
(performance) design Strategy	12.76	35	0.00	1.1	4.11	H2-5	validity
Suppliers whit low cost	5.86	35	0.00	0.7	3.78	H2-6	validity
long-term planning.	8.41	35	0.00	0.9	3.94	H2-7	validity
primary purpose responding	12.76	35	0.00	1.1	4.11	H3-1	validity
primary purpose innovation	6.45	35	0.00	0.80	3.81	H3-2	validity
Lead-time focus (investing)	3.33	35	0.00	0.63	3.64	H3-3	validity
design Strategy (innovation)	10.25	35	0.00	1	4	H3-4	validity
Flexible supplier	15.06	35	0.00	1.5	4.53	H3-5	validity
short-term planning.	10.72	35	0.00	1.3	4.36	H3-6	validity

After confirming three main hypotheses the conceptual model is confirmed.

Figure 3: confirmed model underlying this study.

Supply chain strategy	Agile supply chain (responsive)	Mis match	After decoupling point (match)
	Lean supply chain (efficient)	Match	Before decoupling point)match)
		Standard product	hybrid product
	Product type		

Conclusion

This study is one of the first empirical studies to investigate supply chain strategies and examine the relationship between product characteristics and supply chain strategy. By synthesizing and expanding on existing conceptual frameworks identified in the literature, we proposed new native conceptual framework emphasizes a strategic view of supply chains and highlights the important linkages between product, and its supply chain strategy.

Manufacturers can have different strategies for manufacture of their products such as lean, agile or leagile strategy.

According the represented model Companies with functional products choose a Lean supply chain and Companies with hybrid product choose a Lean supply chain at supply side before decoupling point, And Agile supply chain at Demand side after decoupling point, that means hybrid product choose a Leagile supply chain.

Indeed a lean strategy be established based on low amount of innovative products so companies with this type of production utilizing a lean supply chain strategy while an agile strategy is planed base on much value of innovative products and so a leagile strategy is associated with both of functional and innovative products characteristics and companies utilizing a leagile supply chain strategy for this type of their products.

Limitation and future research

One of the limitations of this study is that the conclusions may not be generalizable to other sectors. There are a number of limitations that influence the

generalizability of this study. *First*, this study limited only on four manufacturing firms, also the sample represent a limited number of companies in limited industry *Second*, the study is based on questionnaire. Therefore, there is a possibility of respondents answering questions in a way that is perceived to be more desirable or acceptable than what is actually experienced or believed. *Third*, Social conditions and the current problems created by International sanctions against iran and exchange rate fluctuations is caused to receive the conflicting answers for example in terms of inventory strategies from respondents, thus, that influence the generalizability of this study.

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