

On the measurement of operations strategy for service firms: A Malaysian study

Abstract. The purpose of this study is to validate the multi-level concept of operations strategy using reflective-formative model at a higher order for service industries. A pilot study of selected services firms was done. In this study, 140 questionnaires were distributed conveniently to managers, middle managers, and top managers of 25 selected service organizations to test the instrument, of which 121 questionnaires were returned and found usable for further investigation. To assess the measurement scale, factor analysis using varimax rotation was conducted. Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were used to demonstrate the suitability of factor analysis. Principle component analysis revealed the presence of seven factors with eigenvalues exceeding 1, explaining 69.505% of the total variance. The result indicated that the reliability of the six factors exceed the threshold value of 0.70. A conceptual model is then proposed.

Enter Key words here. Operations strategy, EFA, Service sector.

Scope of paper for presentation session: Service sector in Malaysia

1. Introduction

Multidimensional or higher order latent construct is gaining researcher attention (Edwards 2001, Law et al. 1998, Faliz and Mohammad 2014). A multidimensional construct consist of a numbers of different and theoretically interrelated dimensions (Law et al. 1998). More clearly, the dimensions of hierarchical construct can be conceptualize under a higher order construct and its parsimonious and theoretically meaningful to use the higher order construct to reflect and present the lower dimensions (Law et al. 1998; Edward 2001). For example, in the field of organizational behavior, employees' perception of fairness in relation to allocation of resources and outcome (distribution justice), individuals' perception of fairness regarding procedures and policies that used distribute organizational outcome (procedural justice), and employees' perception that they have been treated with respect and dignity during the enactment of procedures (interactional justice) are three interrelated construct that can be grouped together theoretically under overall abstraction called organizational justice (Ambrose and Schminke 2009). In operations management, operational performance can be represented a multidimensional construct that consist of four lower dimensions i.e., cost, quality, delivery, and flexibility (Peng and Lai 2012).

Several reasons account for the increase interest in hierarchal construct. Researchers (see Edwards 2001; MacKenzie et al. 2005) suggested that using higher-order construct allows to achieve more theoretical parsimony and reduce complexity. Moreover, broader construct are better predictors of dependent variable than multiple domains and period of time (Jenkins and Griffith 2004). Consistent with this opinion, Johnson et al. (2011) argued that when the main concern of any study is to predict well defined attitudinal or behavioral variable, then higher order multidimensional construct can provide better picture about the relationship. Furthermore, measuring construct at higher order is recommended to overcome the jangle fallacy phenomenon which occurs when one construct is explained by two or more variable that have different label (Kelley 1927).

An important condition for multidimensional construct is to identify the relationship that exist between construct and it is dimension (Law et al 1998). More clearly, its crucial to understand whether the higher order construct affect lower level dimensions in which the indicators are manifestation of the construct (reflective construct), or the indicators are affecting the higher

order construct in which the indicators are defining characteristic of the construct (formative construct) (Jarvis et al. 2003).

Service firms follow certain excellence framework to guide them making better decision and execute strategies (Abdullah et al., 2012). The main concern of this study is to validate the construct of operation strategy at higher order in the service sector. Although there are several scales to measure operation strategy (such as Oltra and Flor. 2010; Joshi, Kathuria, and Porth, 2003; Badri, Davis and Davis, 2000), nonetheless most of these measures are for manufacturing sectors. Additionally, there is a lack of studies that have undertaken the development of context-specific scale, despite the frequent indications that it must be context dependent (Gaither and Fraizier 2002). Furthermore, there is a paucity of empirical research that has validated the dimensionality of operation strategy construct at higher order in the service sector. Therefore, we argue that the concept should be measured using reflective-formative-formative approach at the third order. Organizations decision related to operation strategy is largely influenced by environmental (external) and organizational (internal) factors (Ward et al. 1995). This is consistent with Porter's (1995) opinion i.e. the country where an organization operates can influence the organization decision of operation strategy. Also, the industry in which organization compete also can affect its choice of operation strategy. Accordingly, the main objective of this study is develop and validate a multidimensional ,hierarchal scale to measure operation strategy in service sector, and to examine its ability to predict organizational flexibility in nomological network.

3 Literature Review

This section will briefly explain the importance concepts in this study.

3.1 Operations strategy

Operations strategy is a functional strategy that must be consistent with corporate and business strategy in order for company to firmly position itself in the market (Hayes and Wheelwright 1984). Operation strategy should result in adding value to customer by lowering cost, making product and service available everywhere, providing fast service, and customizing product for customers (Idris 2010). Operation strategy is a long range plan for the company's production scheme of product and services and provides a road map for what operation function need to do in order to achieve the business strategy goals (Gaither and Fraizier 2002). Operation strategy includes decision related to what new product and services must be introduced, what new facilities are required, what new technologies must be used and when to be used (Gaither and Fraizier 2002). In general, operation strategy has been classified into two broad decisions i.e., structural decisions and infrastructural decisions. The following subsection will discuss these two broad decisions (Hayes and Wheelwright 1984; Schroeder 2007).

3.1.1 Structural decisions

Structural decisions are related to tangibles matters like location, capacity, vertical integration, and technology (Davis and Heineke 2005).

a. Location

The location decision of for service organization that deals directly with customer is driven by customer location (Davis and Heineke 2005). For example, fast food restaurant like KFC is likely to be stands everywhere within city to serve their customer better. On the other hand the availability of resources is the driven of service organization that needs not to interact directly with customer. This type of organization can be located anywhere within the country or even overseas. For example customer service for Samsung can be located anywhere around the world to provide their customer with troubleshooting regarding their smart phone.

b. Capacity

The capacity decision is very crucial for service organization (Davis and Heineke 2005). If service organization increases its capacity to high level, this can increase the overall cost which can affect the organization profitability. On the other hand, low capacity can increase waiting time to service customer, this can affect the customer satisfaction and loyalty. Accordingly, service organization capacity must be consistent with organization capabilities and sufficient to satisfy the needs of customer without any delay.

c. Vertical integration

Vertical integration is related to organization decision to control or purchase the source of raw material (backward integration), and/or controlled and purchase the distribution channel where its product sold (forward integration) (Davis and Heineke 2005). For example, an automobile company may own a tire company, a glass company, and a metal company (backward integration). The main concern of controlling these suppliers is to create a stable supply of inputs and ensure a consistent quality in their final product. Moreover, to achieve greater economies of scale and high market share Airline companies may control service organization that provides tour service in the countries where it flies (forward integration).

d. Technology

The technology used by organization to produce it is product and servicer is very important decision that organization must be very conscious. Technologies have proven to be able to offer more opportunities in improving services processes (Idris 2010; Idris , Rejab, and Ahmad, 2008) For example, banks that have ATM technology were able to provide convenient services to customers for years. ATM services has improved the operation service of banks by increasing in the limit of the amount in withdrawal transactions and the multiplication of ATM units strategically situated in many convenient locations (Idris 2010).

3.1.2 Infrastructural decisions

Infrastructural decisions are related to less tangible issue like workforce empowerment, quality leadership, and team managements (Davis and Heineke 2005).

a. Workforce empowerment

Empowerment refers to awarding the citizen of organization a certain level of autonomy and responsibility to make decision regarding their specific organizational tasks. Empowerment of employee can facilitate the process of making decision at the lower levels of an organization where employees have a unique view of the issues and problems facing the organization at a certain level. Worker empowerment involve giving employees a broader range of task, involve them in planning process, increase their responsibility, enhance superior-subordinate relationship, giving them the power to make decision related to their works (Idris 2010). Employee empowerment is expected to increase organizational responsiveness, increase in its productivity, and lead to a greater degree of employee commitment to organizational (Hayes and Wheelwright 1984).

b. Quality leadership

According to Blake and Mouton (1985), leadership is the process of achieving the organizational goals with and through other people inside and outside the organization. Furthermore, Rost (1991) has defined the leadership as the process of interaction between the leader, the follower, and the situation. Therefore, leadership can be perceived and defined to be the influence on other for the purpose of achieving the organizational goals.

Leadership represents an integral part of quality management (Ahire, et al. 1996; Idris ,2011). Individuals or organizations that wishes to take their initial steps on their journey toward quality must begin with a near sighted examination of its organization leadership capability and culture” (Mauro and Mauro 1999, p37). Moreover, Feigenbaum (2007) stated that “quality today has become the foundation for constant management innovation and leadership” (p38). Accordingly Honer (1997) has defined quality leadership as a transformational leader who “searches for ways to help motivate followers by satisfying high order needs and more fully engaging them in the process of the work.” (p275).

c. Team managements

Completion level increased significantly in recent years which force service and manufacturing firms to emphasize the notion of teamwork in order to be able to compete effectively and efficiently in the local and global market (Davis and Heineke 2005). According to Boyett and Conn (1991), team work can help organization to accomplish their goals in term of high high-quality product and services, introducing innovative product and services, and solving customer problem and improved their level of satisfaction. Additionally, Robert et al. (1992), demonstrated that teamwork can enhance the skills of its members, eliminate the barrier of organizational structure by gathering people from different functions, make employee more willing to accept and adopt changes that can take place inside organization, and work as platform to train employees to be leader .Team management refers to techniques, processes and tools for organizing and coordinating a group of individuals working towards a common goal or task (Hensey, 2001).Typically, teamwork refers to groups of interdependent individuals who work cooperatively to achieve group outcomes (Griffin et al. 2001).

4. Methodology

4.1 Measure

The term operation strategy is used to refer to strategic decision with respect to infrastructural and structural elements that service organizations are required to consider and decide on in order to enhance and improve the performance of their organizations (Garrido et al. 2007). To develop scale to measure operation strategy at higher order, this study has investigated the commonly cited factors that influence operation strategy in service sector. Through this process, two primary dimensions (i.e. Infrastructural and structural elements) and seven sub dimensions (i.e., location, capacity, integration, technology, worker empowerment, quality leadership, and team management) were identified (Table 1). Based on extensive review for literature, the most tangible sub dimension i.e. location, capacity, technology and integration where treated as indicators of structural elements. On the other hand, the less tangible sub dimension i.e., worker empowerment, quality leadership, and team management were treated as the indicators of infrastructural elements (Davis and Heineke 2005; Gaither and Fraizier 2002; Garrido et al. 2007). Throughout exploration of the conceptual definition of operation strategy it was frequently cited as multidimensional, hierarchical construct (Bucki and Pesqueux 2000; Garrido et al. 2007; Idris 2010).

To ensure content validity, extensive review of literature was conducted to define each construct and generate items for measuring constructs. Out of the extensive literature 29 items were adapted from past studies which mostly come from manufacturing setting. (Boyer and McDermott 1999; Boyer et al. 1996; Flynn et al. 1994; Ward et. al. 1994) (Table 1). At least, a service factory setting, according to Schmenner (1986) should resemble that of a manufacturing setting. To ensure construct validity the 29 items were subject for Q-sort. This technique showed the degree of accurate assignment of items within different categories of constructs, which provide enough evidence of construct validity by ensuring the convergence and divergence of items (Akter et al. 2013). A panel of practitioners and academician helped to sort each item under operation strategy dimensions. Toward the ends the 29 items were sorted under the seven dimensions as shown in Table 1.

Table 1: Operation strategy dimensions based on literature

No.	Dimensions	subdimensions	Items	Researchers and years
1	Structural elements	Worker empowerment	Giving employees a broader range of tasks	Boyer and McDermott (1999), Flynn et al. (1994) Ward et. al. (1994)
2			Giving employees more involvement in planning	
3			Giving employees more quality responsibility	
4			Enhancing superior-subordinate relationship	
5			Enhancing employees motivation	
6			Improving employees training	
7			Improving supervisor training	
8	Quality leadership		All heads of department in the firm accept responsibility for quality	
9			Top management provides personal leadership for quality improvement	
10			All heads of department encourage employees involvement in the service delivery processes	

11			Top management give high priority in evaluating quality performance	
12			Performance management is extensively carried out in our firm	
13			Clear performance measures are applied in our firm (e.g. KPI measurement system, etc.)	
14		Team management	Our firm form teams to solve problems	
15			Many problems have been effectively solved through team efforts	
16			Many problems have been effectively solved through team efforts	
17			All team members' opinions and ideas are considered before making a decision	
18	Infrastructura l elements	Location	Please indicate the proximity of your firm location to your target customer	Boyer and McDermott (1999); Boyer et al. 1996)
19			Please indicate the accessibility of your firm location to your target customer	
20		Capacity	Upgrading / improvement of existing facilities	
21			Expansion of facilities (e.g. adding more check-in counters or queue lines, moving to new facilities, etc.)	
20		Integration	Forging a partnership with related agencies	
21			Forging alliances with suppliers	
22			Forging relationship with customers	
23			Forging close relationship with local communities	
24		Technology	ICT system for firm operations (e-mail system, Intranet system, fax, telephone, etc.)	
25			Computerized customer information (e.g. customer's database)	
26			An integrated information system for tracking customer record	
27			Firm's homepage with sufficient information	
28			On line system(e.g. booking, registration, appointment)	
29			Latest technology relevant for enhancement of the business operations (e.g. latest scanning systemfor hospital or new ATMs for banks)	

4.2 Instrument testing

The questionnaire was developed in English. To ensure the face validity of the questionnaire in term of readability, understandability, difficulty, its format and layout, and sequence of questions, this study has carried out a pretest over 10 MBA student whom they have working experience at service organizations. Minor modification was made based on pretest results.

Individuals who are holding managerial positions were the sampling units of this study. As it was difficult to include all service organizations in the sample, non-probability quota sampling was utilized. In quota sampling, the target population is divided into mutually exclusive sub-groups. Then judgmental sampling can be used to select the subjects from each group based on an identified proportion and characteristic. In this study researchers grouped organizations based on type of service (fast food restaurant, hotels, hospital, auto repair, retail store, bank, private

college, architect, and accountant), then 3 to 5 managers from each organization were selected. The demographic profile of respondents are shown in Appendix A.

4.3 Pilot study

In the present study 140 questionnaires were distributed conveniently to managers, middle managers, and top managers of 25 selected service organizations to test the instrument, 121 questionnaires were returned and found usable for further investigation. To assess the measurement scale, factor analysis using varimax rotation was conducted. Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were used to demonstrate the suitability of factor analysis (Bartlett 1954; Kasier 1974). In the current study Bartlett's test of Sphericity was significant ($p=0.000$), and KMO value was 0.805 which exceeded the cut-off value of 0.60 (Kaiser 1970). Principle component analysis revealed the presence of seven factors with eigenvalues exceeding 1, explaining 69.505% of the total variance (Table 2 and 3). Factor weight of 0.50 was used as the minimum cutoff and if any item loads on more than one factor with difference between weights less than 0.10 across factors, the item was deleted from final scale (Hair et al. 1998). Through the process of EFA three items were deleted i.e., InfQL6, InfTM1, and StI3 due to low communality values (less than 0.50) (Hair et al. 2006). Reliability analysis for the seven extracted factors was then conducted (Table 3). The result indicated that the reliability of the six factors exceed the threshold value of 0.70 (Nunnaly 1978).

Table 2: Exploratory factor analysis results for pilot study

Code	Items	F1	F2	F3	F4	F5	F6	F7
InfWEP1	Giving employees a broader range of tasks	.634						
InfWEP2	Giving employees more involvement in planning	.586						
InfWEP3	Giving employees more quality responsibility	.641						
InfWEP4	Enhancing superior-subordinate relationship	.679						
InfWEP5	Enhancing employees motivation	.609						
InfWEP6	Improving employees training	.674						
InfWEP7	Improving supervisor training	.661						
InfQL1	All heads of department in the firm accept responsibility for quality		.771					
InfQL2	Top management provides personal leadership for quality improvement		.808					
InfQL3	All heads of department encourage employees involvement in the service delivery processes		.842					
InfQL4	Top management give high priority in evaluating quality performance		.849					
InfQL5	Performance management is extensively carried out in our firm		.639					
InfTM2	Our firm form teams to solve problems			.804				
InfTM3	Many problems have been effectively solved through team efforts			.849				
InfTM4	All team members' opinions and ideas are considered before making a decision			.764				
StL1	Please indicate the proximity of your firm location to your target customer				.897			
StL2	Please indicate the accessibility of your firm location to your target customer				.853			

StC1	Upgrading / improvement of existing facilities	.732
StC2	Expansion of facilities (e.g. adding more check-in counters or queue lines, moving to new facilities, etc.)	.659
StI1	Forging a partnership with related agencies	.769
StI2	Forging alliances with suppliers	.859
StI4	Forging relationship with customers	.616
StI5	Forging close relationship with local communities	.688
StT1	ICT system for firm operations (e-mail system, Intranet system, fax, telephone, etc.)	.647
StT2	Computerized customer information (e.g. customer's database)	.824
StT3	An integrated information system for tracking customer record	.770
StT4	Firm's homepage with sufficient information	.782
StT5	On line system(e.g. booking, registration, appointment)	.658
StT6	Latest technology relevant for enhancement of the business operations (e.g. latest scanning system for hospital or new ATMs for banks)	.633

Table 3: Result of Exploratory factor analysis of the refined scale

Factor	Items	Factor loadings	Eigenvalues	% variance	Cumulative %	Cronbach's alpha
Worker empowerment	InfWEP1	.634	8.512	29.351	29.351	0.844
	InfWEP2	.586				
	InfWEP3	.641				
	InfWEP4	.679				
	InfWEP5	.609				
	InfWEP6	.674				
	InfWEP7	.661				
Quality leadership	InfQL1	.771	3.078	10.615	39.966	0.877
	InfQL2	.808				
	InfQL3	.842				
	InfQL4	.849				
	InfQL5	.639				
Team management	InfTM2	.804	2.420	8.345	48.310	0.867
	InfTM3	.849				
	InfTM4	.764				
Location	StL1	.897	1.753	6.044	54.354	0.848
	StL2	.853				
Capacity	StC1	.732	1.596	5.504	59.858	0.777
	StC2	.659				
Integration	StI1	.769	1.418	4.888	64.747	0.778
	StI2	.859				
	StI4	.616				
	StI5	.688				
Technology	StT1	.647	1.380	4.759	69.505	0.857
	StT2	.824				
	StT3	.770				
	StT4	.782				
	StT5	.658				
	StT6	.633				

4.4 Conceptual model

Based on the literature support and the factor structure of operation strategy in the exploratory study, a conceptual model (Figure 1) is proposed to measure the dimensions, subdimensions of operation strategy and their association with organization flexibility in a nomological network. This study specifies operation strategy as hierarchical model comprising two primary dimensions (i.e., infrastructural element and structural elements) and seven subdimensions (i.e., worker empowerment, quality leadership, team management, location, capacity, networking, and technology). Based on theoretical argument set via Jarvis et al. (2003), Petter et al. (2007), and Akter et al. (2013) this study argued that operation strategy is higher order, multidimensional, reflective-formative-formative construct, which is discussed in further detail in the following subsection.

4.4.1 Theoretical differences between reflective and formative model

The measurement model identifies the relationship between indicators and their respective latent construct (Hair et al. 2013). The relationship between latent construct and its indicators can be reflective in which the direction of causality started from construct and end at indicators or formative in which the direction of causality start at indicators and end at the construct (Fornell and Bookstein 1982). The decision whether measurement model is reflective or formative must be decided based on theoretical justification and empirical evidence (Johnson et al. 2011). Decision rules for determining whether a construct is formative or reflective are shown in Table 4

4

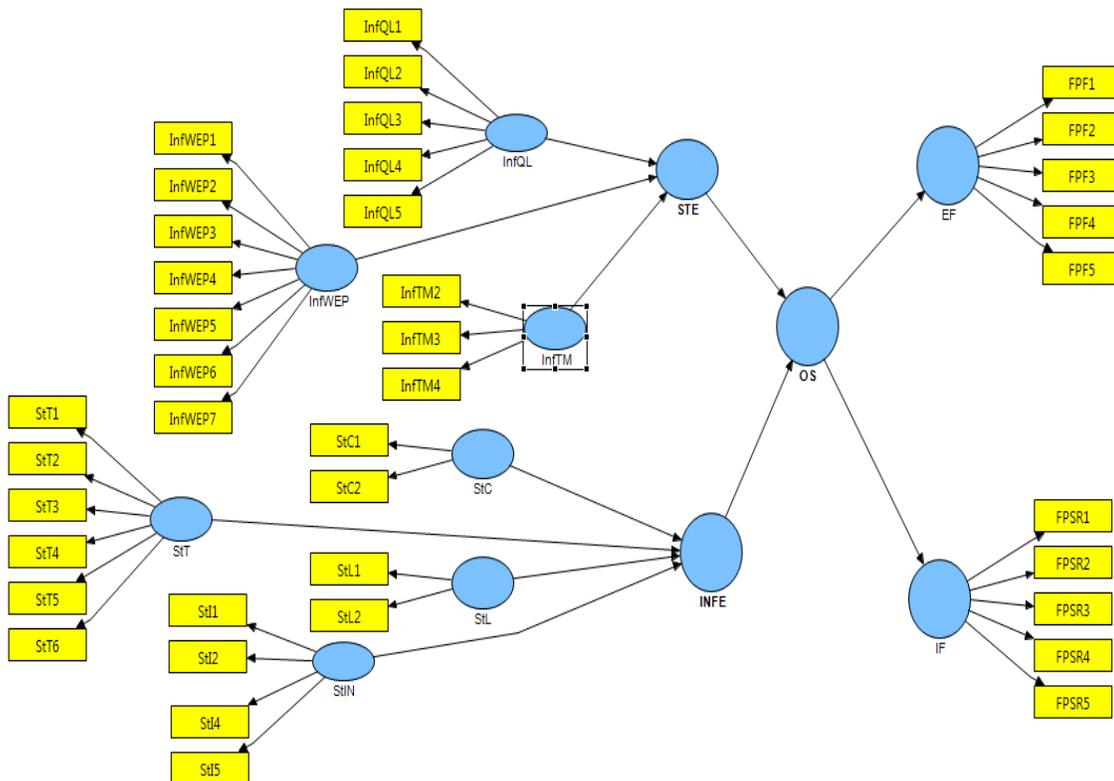


Figure 1: Operation strategy model for service sector

Table 4: Comparison between reflective and formative model

Criteria	Reflective	Formative
Direction of causality	Direction of causality is from constructs to indicators. This means indicators are manifestation of the construct. Therefore, any changes in the construct will change the meaning of indicators, whereas, any changes in the indicators will not change the meaning of construct	Direction of causality start from indicators and end at construct. This means indicators are defining characteristic of the construct. Thus, changes in the indicators will change the meaning of construct, whereas, changes in the construct will not change the meaning of indicators.
Interchangeability of indicators	Indicator must be interchangeable, have similar content and share common theme. Consequently dropping and item will not change the conceptual meaning of the construct because all items are reflecting the same underlying construct.	Indicators are not interchangeable, don't have similar content and not necessary to share common theme. Therefore dropping any indicator can change the conceptual meaning of the construct, because each indicator reflect specific characteristic of the construct.
Covariation among the indicators	Indicators are expected to be highly correlated, because they are measuring same underlying construct	Not necessary for indicator to be correlated.
Nomological net of the construct indicators	Nomological net for the indicators should not differ	Nomological net for the indicators may differ

Source: Jarvis et al. (2003), and Urbach and Ahlemann (2010)

5. Discussion and Conclusion

The purpose of this study was to develop and validate instrument to measure operation strategy at higher order in service sector in Malaysia: the development of reliable and valid scale is the main concern of the study. Extensive review of literature and empirical evidence support the formulation of third order, hierarchical, reflective-formative-formative scale. The findings of this study suggest that operation strategy in service organization is based on two basic dimensions i.e., structural and infrastructural decisions. These basic decisions are determined by seven underlying dimensions i.e., capacity, location, integration, technology, worker empowerment, quality leadership, and team management. The hierarchical nature of the scale suggests that the third order construct operation strategy is formative by the two second order construct, which in turn are formative by the seven first order constructs.

This research extends operation management research by specifying and estimating a higher order formative operation strategy model. A large scale study is currently carried out to test the model.

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Appendix A

Demographic profile of firm and participant (Pilot study)

		Frequency (N)	Percentage (%)
Type of service	Hotel	14	11.6
	Fast food restaurant	9	7.4
	Hospital	13	10.7
	Auto repair	9	7.4
	Retail store	15	12.4
	Bank	22	18.2
	Private college	17	14.0
	Architect	12	9.9
	Accountant	10	8.3
	Firm's market	Local	68
Regional		17	14.0
Global		36	29.8
Profession	Manager	51	42.1
	Middle manger	8	6.6
	Top manger	33	27.3
	others	29	24.0
Tenure	5 years and less	61	61
	6 -10	22	22
	11-15	19	19
	16 years and above	19	19
Years operation of firm	5 years and less	20	16.5
	6 -10	28	23.1
	11-15	20	16.5
	16 years and above	53	43.8