The Asian Journal of Technology Management Vol. 12 No. 1 (2019): 58-69

Acquisition of Technological Capability by Firms in the Aerospace Cluster of Bengaluru

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Abstract. *Technological capability is believed to be the ability of a firm to make innovations in its products and manufacturing processes. It is especially important for SMEs to make informed choices of technology to meet global quality standards and adopt the best practices to ensure productivity. The acquisition of technological capability takes place through deliberate efforts by firms, which is characterised as technological learning mechanisms in the literature. This paper provides an assessment of influence of technological learning mechanisms on the acquisition of technological capability of SMEs in the Bengaluru aerospace cluster in south India. Firstly, a measure is developed to quantify technological capability at firm level. Seventeen variables, which form the building blocks have been factored into four factors in order to develop the measure called Technology Index (TI). Secondly, learning variables, which significantly influence technological capability have been identified through regression analysis. Learning variables education of CEO, years of operation in aerospace industry and vertical collaboration have been found to significantly influence technological capability of firms. This analyses lead to important lessons both for entrepreneurs and policy makers.*

Keywords: *Technological capability, technology index, aerospace cluster, learning variables, technology measurement.*

1. Introduction

Technological capability is defined as the capability of a firm to innovate, select the right technology, assimilate it and bring in significant improvements in its products and processes (Lall, 1987). Jin & Von Zedtwitz (2008) elaborates the technological capability as capacity of a manufacturing firm to make effective use of technical knowledge and skills in all areas including development of products & processes, improvement of existing technologies, generation of new knowledge and skills in response to the competitive business environment. Thanks to rapid changes in technology and expansion of global supply chains, technological capability has taken the centre stage in the extant literature.

Technological capability may be characterized as the application of knowledge and technical skills to make improvements in products and processes. It is believed to be a firm's core strength which results in the manufacture of high-quality products. Technological capability enables a firm to put deliberate and purposeful efforts to scout for new technical knowhow, to adapt them and also to translate the same into improvements in products and processes. Lall (1987) has led the way by

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Received: March 14th, 2019; Revised: March 23th, 2019; Accepted: March 26th, 2019
Doi: http://dx.doi.org/10.12695/ajtm.2019.12.1.5
Print ISSN: 1978-6956; Online ISSN: 2089-791X.

proposing a taxonomy wherein technological capability comprises a set of functions required to set up, operate and transfer imported technologies in developing countries. Recent literature pertaining to industrial development has given lot of importance to technological capability since it is important for better performance of a firm in the competitive environment. Some of the prominent studies are; the efficacy of technological capability in the farm implements industry of Sialkot in Pakistan (Romijn 1997), pharmaceutical industry in India (Bhaduri & Ray, 2004), the foundry clusters of Coimbatore and Belgaum in India (Raghavendra & Bala Subrahmanya, 2005), the electronics industry in Mexico (Iammarino, Padilla-Pérez, & Von Tunzel-mann, 2008), Chinese telecommunication industry (Cai & Tylecote, 2008), electronic industry in Malaysia (Chandran & Rasiah, 2013), automobiles and electronics industry in Sri Lanka (Wignaraja, 2012), Information and Communication Technology (ICT) industry (Aderemi & Oyebisi, 2012), Brazilian naval industry (Baginski, Pitassi, & Barbosa, 2017), and so on.

The researchers cited above, by and large, agree that technological capability is a highly descriptive characteristic of a firm. It is believed to be made up of three attributes; production capability, innovation capability and investment capability (Albu & Bell, 1999). Production capability reflects the ability of a firm to manufacture the product as per the required quality norms utilising the machines, tools, materials, labour, etc. On the other hand, innovation capability enables a firm to make minor or major innovations in its products and processes. Investment capability helps a firm to take technically feasible and economically viable decision while making investment on plant, machinery and materials. There is a consensus in literature that certain technological learning activities lead to the acquisition of technological capability in a firm. These activities are believed to be pursued by a firm to improve its technological capability. The learning activities help a firm to learn new technological knowhow and bring in the internal changes in the organisation to effect improvements in products and processes. Some of the consequences of technological learning could be acquisition of higher end machines, improvements in design of components, usage of new class of software tools for design, automation of production process, improvements in productivity through optimisation techniques, and so on and so forth. The technological learning may be facilitated through several channels, such as, the supply chain, peer firms, industry associations, government promotional agencies, etc., (Petralia, Balland, & Morrison, 2017).

In this background it is important for researchers to develop a methodology for quantifying the variables of interest, so that rigorous quantitative analysis could be carried out to establish relationships between technological capability and various learning variables, which are believed to influence it. A few research studies have been reported in 1990s and early 2000s, based on case study methodology, which made qualitative assessment of these relationships (Bell & Pavitt, 1997). However, in recent times, more studies have been reported, which bring in quantitative rigor by identifying suitable indices and proxies for measuring the variables of interest. Studies by Domínguez and Brown (2004) on the manufacturing industry of Mexico and Molina-Domene & Pietrobelli (2012) pertaining to the study of several south American industries, have given impetus to quantitative analysis.

This paper analyses the influence of various technological learning variables on the technological capability of small firms. It proposes a methodology for quantifying technological capability and the learning mechanisms, which facilitates use of rigorous statistical techniques. It is also relevant here to mention two additional dimensions, which make this study important. Firstly, the study is confined to predominantly small-scale industries (SSIs) in the aerospace cluster of Bengaluru in South India. The SSIs are the backbone of the aerospace cluster of Bengaluru, which is on the threshold of huge expansion in the coming years. The presence of aerospace majors such as Hindustan Aeronautics Limited (HAL), National Aerospace Laboratory (NAL), Indian Space and Research Organisation (ISRO), Defence Research and Development Organisation (DRDO) and many other premier manufacturing and research institutions have created a conducive atmosphere for small firms to keep abreast of new technological developments. Secondly, the firms in the cluster enjoy locational advantages thanks to proximity of large number of peer firms, suppliers, lenders, service providers, industry associations, and so on. Therefore, we had to factor in several variables, which are unique to industry clusters, which makes the study more interesting.

2. Development of a Measure for Technological Capability

Romijn (1997) was one of the foremost researchers, who proposed a methodology for quantifying technological capability. She acknowledged the widely accepted theory that technological capability comprises three major dimensions, namely, production capability, innovation capability and investment capability. However, she argued that production capability should be considered predominantly for measuring technological capability in small firms. The reason being that firm size and limited resources inhibit significant capability enhancement in technological innovations in small firms. Also, since the small firms operate on limited scale, it does not call for significant capability for making investment choices. This methodology has been used as the basis for many of the later studies by Raghavendra & Bala Subrahmanya (2005), Wignaraja (2012) and others.

Hajihoseini, Akhavan, & Abbasi (2009) propose a broader definition of technological capability in terms of indigenous technological capability (ITC). Four primary factors, namely, acquisition of technology, absorption of technology, in-house technology and diffusion of technology are used as four different proxies, which reflect technological capability of firms. In addition, four additional variables are used as intervening factors. Thus, quantification of ITC enables them to test six hypotheses, in order to assess the influence of several independent variables on ITC. Even though the methodology provides a broader meaning for technological capability, it uses multiple proxies for ITC, which may lead to difficulties in drawing conclusions.

This paper concurs with the arguments of Romijn (1997) and production capability is the predominant dimension considered for developing the technology index for measuring technological capability. The proposed methodology differentiates between technological capability and technological learning mechanism as per the taxonomy adopted by Bell and Pavitt (1997) and widely accepted in the literature. A total of seventeen contributing variables, which are essentially the building blocks of technology index (TI), were identified by extensive literature survey and discussion with experts from the industry. This included managing directors, owners and senior managers in OEMs. Production related activities continues to be the main factors that determine the technological capability of firm. However, we have included other activities which were not used in research studies earlier such as "advanced analytical tools", "add-on order handling capacity", "usage of internet for business" "marketing skills", "labour skill enhancement" and "quality certifications". Identification of these variables gave new dimension to technological index which traditionally was determined by only production related activities. This reflects the changes we observe in working environments of firms. These variables were grouped into four factors, by running factor analysis routine on Minitab. The tabulation of loadings and communalities is shown in table A1 in annexure A. In factor analysis, we select number of groups to which the variables need to be assigned. In this case it was four. Factor analysis gives the loadings (or orientation) each variable has on the four factors. One should group variables having high loading towards one of the factors. Subsequently, the factors are given a nomenclature based on the variables mapped to each factor. The total variance explained was 71.70%, with fifteen of seventeen variables being acceptable to one of the four factors whereas two of the variables having lower loading were rejected. Depending on the nature of the variable in each group, the factors were assigned names as follows:

i. Production Capability:
   This factor exhibits the capability of a firm in production. Most researchers agree that for SMEs, this capability predominantly reflects technological capability. The variables contributing to this factor are availability of *raw materials, skilled labour, material handling facility, engineering drawing capability, documentation of work, quality standards* in practice, *advanced analytical tools* and *advanced software* for data analysis
ii. Physical Capacity:
   This factor reflects the ability of the firm to plan and expand manufacturing infrastructure. It indirectly influences the investment capability of the firm. The variables contributing to this factor are *infrastructure, continuous order taking capacity* and *add-on order handling capacity*.
iii. Marketing Capability:
   This factor determines how proactive the firm is towards identifying and exploiting business opportunities. The variables contributing to this factor are *usage of internet for business* and *marketing skills*.
iv. Continuous Improvement:
   This factor represents the internal mechanism to ensure continuous improvement. The variables contributing to this factor are *labour skill enhancement* and *quality certifications*.

3. Technological Learning Variables

Technological capability is influenced by learning variables. These variables strengthen the capabilities for generating and managing technological capability (Bell & Pavitt 1992). Albu & Bell (1999) have characterised learning variables as endogenous and exogenous. While the endogenous variables arise out of mechanisms built within a firm, exogenous variables are the outside forces, which trigger technological learning. After extensive literature survey and discussion with industry experts a total of nine learning variables were selected for the study. These independent variables are listed below:

i. Education level of CEO (YCEO)
ii. Years in operation in aerospace industry (YAI)
iii. Firm Size (FS)
iv. Horizontal Collaboration (HC)
v. Vertical Collaboration (VC)
vi. Impact of Offset Policies (IOP)
vii. Interaction with local industrial association (ILIA)
viii. Interaction with overseas companies (IOC)
ix. Migration of skilled labour (MSC)

The score range for learning variables differs from one to another. This is because the range of each variable depends on different attributes that can be accounted for to define a variable. Therefore, for example, the variable Vertical Collaboration (VC) can be captured fully in terms of the engagement of the firm with local suppliers, sub-contractors, external suppliers etc. The breaking of the score is given in Annexure-B for the learning variables vertical collaboration and horizontal collaboration. The nature and predicted impact of each independent variable is discussed in table 1 below. While the first five variables are ordinal, the rest four are dummy variables.

Table 1.
Learning Variables Identified for the Study

Serial No.	Learning Variable	Description	Score Range
1	Education level of CEO (YCEO)	For a small firm, the education level of owner or Manager or chief executive officer is important in decisions taken by the company. A technically educated leader will have better capability of identifying opportunities for improving technology. The score for education level is set between zero to four. An entrepreneur having a technical education is assigned value 4, while a regular graduation is assigned 3, a diploma holder is assigned 2 and a Manager having basic industrial training is assigned 1. If the owner/CEO is not having any of the said formal education the value assigned is 0.	0-4
2	Years in operation in aerospace industry (YAI)	Years of operation is believed to provide a company required exposure about the industrial environment. The firm acquires and documents technological knowhow. More importantly, by virtue of being in the field for a long time, key people in the firm acquire tacit knowledge, which comes in handy while taking big leaps in technological development. This variable is measured from 1 to 5. A firm having more than 20 years of experience is assigned a value of 5, a firm having experience between 15 to 20 years is assigned a value 4, a firm having a experience 10 to 15 years is assigned a value 3, a firm having a experience 5-10 years is assigned 2 whereas a firm having less than 5 years of experience is assigned a value 1.	1-5
3	Firm Size (FS)	Firm size is believed to be a reflection of the strength of a firm. Higher the firm size, better is its capacity to absorb technological information. Firm size also reflects the financial strength of a firm. This will also enable to accept new orders on short notice, rearrange work force on changing customer demand. The independent variable is assigned a value from 1 to 5. A firm which has employee strength of more than 250 is assigned a value 5, a firm with employee strength between 100 to 250 is assigned value 4, a firm with a employee strength 50 to 100 is assigned value 3, a firm with employee strength 25 to 50 is assigned a value 2 and a firm having strength less than 25 is assigned 1.	1-5
4	Horizontal Collaboration (HC)	Horizontal collaboration is the interaction of the firm with its peers among the industry. This interaction also considers the interaction with R&D and testing centers along with cooperation fostered by industry associations. It is measured from 1 to 15 on a set of various activities, details of which is given in annexure-B.	0-10
5	Vertical	The vertical collaboration takes place through the supply chain.	0-15

	Collaboration (VC)	The score which is assigned for the interaction a firm has established with its suppliers and customers. Vertical collaboration is measured by a composite variable with a score from 0 to 15, which covers the firm's activities with local suppliers, external suppliers and customers. The structure is given in annexure-B	
6	Impact of Offset Policies (IOP)	This variable captures the impact that the offset policy of the Government has on a firm. Various countries including India have implemented offset policies to safeguard domestic industries. Some of the researchers have argued that offset policy will have favourable effect, especially on tier 3 firms in the aerospace cluster. This is measured by a dummy variable where 1 indicated yes whereas 0 indicated no.	0 or 1
7	Interaction with local industrial association (ILIA)	Industrial association play an active role in the smooth functioning of a firm. They establish contacts, arrange avenues for finance and provide a forum to address technological issues. This variable measures the impact local industries have on technological capability of the firm. This was measured by a dummy variable where 1 indicated yes whereas 0 indicated no.	0 or 1
8	Interaction with overseas companies (IOC)	Interaction with overseas companies is possible when a firm has achieved acceptable competence in certain areas. Firms which are technologically competitive tend to operate with overseas customer. This variable will try to identify whether interaction with overseas company is linked to higher technological capability of the firm. This is measured by a dummy variable where 1 indicated yes whereas 0 indicated no.	0 or 1
9	Migration of skilled labour (MSC)	Migration of skilled labour is one of recurring challenges industries face. There are various reasons which prompt skilled employees to shift firms. Also, Bengaluru has been home to automobile industry, electronic industry, tool industry along with the IT industry. Therefore, there is a strong possibility of migration of workforce among these clusters. This variable tries to identify if migration of skilled labour is influencing technological capability of a firm. This is measured by a dummy variable where 1 indicated yes whereas 0 indicated no.	0 or 1

4. Influence of Learning Variables on Technological Capability

The study is confined to the Bengaluru aerospace cluster. The cluster comprises firms located predominantly in industrial estates of Bengaluru at Peenya, Electronic City, Whitefield and Bidadi. The database of companies registered in the cluster was sourced from the District Industries Centre (DIC) and cross verified with the members list provided by the Society of Indian Aerospace Technologies and Industries (SIATI), an aerospace association of firms of Bengaluru. Accordingly, there are around two hundred and fifty small and medium scale firms in the aerospace cluster. They provide products and services to various domains of aerospace industry such as engine components, castings & forgings, machined components, seats, apparels, consumables, etc. The sample selection was done based on "randomized block design". The major domains, mentioned above were identified as blocks and random samples were drawn from each block, based on the ratio of firms in each domain. The number of firms selected for the survey was fifty one. Data was collected by canvassing the schedules. The questionnaire was filled up in the presence of owner/manager involved in the direct operation of the firm. On the one hand, it ensured construct validity and on the other hand, the personal interaction provided the opportunity to build good rapport and elicit additional information, which provided better insights about the industry.

Multi linear regression analysis was carried out to assess the influence learning variables have on technological capability. The results of the regression analysis are given in table 2 below.

Table 2.
Regression of Learning Variables on TI

Adjuster R^2		0.72
F		9.94
n		51
	Coefficient	17.52
Constant	t-value	2.08
	Significance	0.000
Significant Variables		
	Coefficient	4.99
Education of CEO (ECEO)	t-value	2.29
	Significance	0.032
	Coefficient	4.15
Years in operation in aerospace industry (YAI)	t-value	2.78
	Significance	0.011
	Coefficient	1.486
Vertical Collaboration (VC)	t-value	3.02
	Significance	0.006
Insignificant Variables		
	Coefficient	2.54
Firm Size	t-value	1.77
	Significance	0.084
	Coefficient	1.014
Horizontal Collaboration	t-value	1.42
	Significance	0.164
	Coefficient	4.63
Impact of Offset Policies (IOP)	t-value	1.43
	Significance	0.159
	Coefficient	-3.68
Interaction with local industrial association	t-value	-0.96
	Significance	0.341
	Coefficient	-3.81
Interaction with overseas companies (IOC)	t-value	-1.16
	Significance	0.253
Migration of skilled labour (MSC)	Coefficient	1.96
	t-value	0.63

Significance	0.532

The regression model has achieved good explanatory power with the value of adjusted R^2 being 0.72. Three learning variables, namely, education level of CEO, years in operation in aerospace industry (YAI) and vertical collaboration (VC) have turned out to be significant. Entrepreneurs without formal education, leave alone, technical education is seen commonly among SMEs in India. However, an entrepreneur/manager with formal education will have better capability to identify opportunities for exploiting new technical knowhow. Experience helps the firm to understand better the requirements of the industry. This is also reflected where years in operation in aerospace industry has significance on technological capability of the firm. Experience enables a form not only to understand and document new technical knowhow, it also builds tacit knowledge among the people who manage the transition to newer technology. Vertical Collaboration has the next highest significance. This is on expected lines, since the Bengaluru aerospace cluster is home to many suppliers, sub-contractors, funding organisations, government promotional agencies, and so on. Any new technical information will flow through the channels, which is beneficial to small firms. There is sharing of information and knowhow regarding new equipment, processes, quality issues, etc., on a regular basis.

The learning variables that were not significant were horizontal collaboration (HC), firm size (FS), impact of offset policies (IOP), interaction with local industry association (ILIA), interaction with overseas companies (IOC) and migration of skilled labour (MSC). Even though an industrial cluster provides close proximity for peer firms, *HC* may be of a low key because of competitive pressures. Perhaps, an entrepreneur wishes to guard technological knowhow from his close competitors. *Firm size* also does not have any significant impact on technological capability, which may be due to the survey restricted to predominantly tier-3 and tier-4 firms.

The fact that the variable IOP is not significant should raise quite a few eyebrows. It is clear that the benefits of offset policy are not percolating to the small firms in the industry. Industry associations generally provide a platform for sharing and exchanging of technological information. This fact has been reported in various studies conducted on industrial cluster. However, the aerospace associations in Bengaluru do not seem to be proactive in disseminating technological information to the member firms. These associations could also help firms build links with overseas companies for not only creating business opportunities, but also enabling transfer of technical knowhow.

5. Discussion and Conclusion

There is a consensus in literature that technological capability enables firms to assimilate new technology and make rapid changes in products and processes to be competitive in the field. There is a need for policy makers as well as industry stakeholders to understand the so-called learning activities, which build technological capability in firms. This paper has presented an approach, which enables the assessment of influence of learning variables on the acquisition of technological capability, especially for smaller firms in an industrial cluster. This approach relies on measurement of variables of interest, which is essential for employing rigorous quantitative tools for probing the relationships.

The first step in this direction is the development of a measure of technological capability. This was done by extensive review of literature and discussion with experts from the industry. Four factors were identified, which are the building blocks of technology level at firm level. The factors encompassed most of the variables which were shortlisted for the study. The factors have been validated for construct and found to differentiate firms based on technology level.

A total of nine learning variables were identified to assess their influence on the acquisition of technological capability in firms. Suitable proxies were employed to quantify these variables. Regression analysis was carried out to identify the influence learning variables have on technological capability of a firm. The results indicate that for the firms operating in the Bengaluru aerospace industry, technological capability is significantly influenced by vertical collaboration, educational level of CEO and years of operation in aerospace industry.

Surprisingly, horizontal collaborations does not significantly influence the acquisition of technological capability. The proponents of cluster theory argue that active collaboration among peer firms could be observed in industrial clusters. However, it does not appear to be a significant aspect when it comes to sharing technological information. It has been observed that sharing of technological information is facilitated to a limited extent through the local industry associations.

The benefits of offset policy of the government are not percolating to small firms. Since the basic thinking behind this policy is to nurture the growth of small firms, the government needs to fine tune the delivery mechanism to enable small firms to scale up both financially and technologically. A study is required to probe to what extent technology transfer is taking place from the OEMs to offset partners.

These findings have important implications for policy makers. The supply chain needs further strengthening by way of encouraging high value adding players such as lenders, technology consultants and service providers to set up shops in the cluster. To compensate for low interaction among peer firms, local industry association needs more patronage from the government. Rebolledo & Nollet (2011) have provided evidence of the significant role played by industry association in the Canadian aerospace cluster. Setting up of testing and service centres by industry association with government support is a feature that has been observed in successful industry clusters. Another key initiative would be setting up of technology innovation centres along with facilitation of quality certification.

The Government of India (GoI) under its flagship programme "Make in India", as well as several State governments have launched many funding schemes for modernisation and technology upgradation of SMEs. It would be prudent on the part of Government to provide preferential treatment to those SMEs, which have better capability for identifying the right technology and assimilating the same for improving technological capability. The government of India has introduced several schemes to ensure flow of funds to SMEs in aerospace clusters. Several States, such as Karnataka, Uttar Pradesh, Punjab and Haryana have come out with comprehensive aerospace policies to boost the growth of the industry by preferential funding of projects. However, the onus is on the government to ensure that the amount is well spent resulting in tangible outcomes. The methodology proposed in this paper could provide a credible means of identifying those companies, which have better chance of success.

In conclusion, it is clear that strategic initiatives based on key research studies are the need of the hour to boost technological capability of aerospace SMEs. While the whole world is looking at India as the potential aerospace hub in the Asia-Pacific region, it is imperative on the part of policy makers to strengthen the mechanisms, which boost technological capability of firms.

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Annexure A
Table A1:
Factor Loadings and Communalities.

Serial No.	Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality
1	Labour Skill enhancement	0.436	-0.498	-0.359	0.658	1.000
2	Availability of Raw Materials	0.598	-0.306	-0.445	0.268	0.721
3	Skilled Labour	0.684	-0.253	-0.116	0.345	0.665
4	Facilities	0.676	-0.348	-0.403	0.386	0.890
5	Certifications	0.440	-0.270	-0.181	0.760	0.877
6	Feedback on Drawings	0.660	-0.292	-0.291	0.292	0.691
7	Documentation of Work	0.839	-0.074	-0.296	0.281	0.876
8	Usage of Internet for business	0.352	-0.145	-0.662	0.231	0.636
9	Quality Standards	0.848	0.008	0.009	0.530	1.000
10	Advanced Tools	0.807	-0.224	-0.229	0.226	0.805
11	Infrastructure	0.029	-0.564	-0.033	0.078	0.326
12	Meeting Standards Specification by customer	0.193	-0.485	-0.037	0.154	0.297
13	Continuity Order taking capacity	0.073	-0.727	0.230	0.180	0.620
14	Add on order handling	0.187	-0.811	-0.113	0.006	0.705
15	Tax policy	0.528	-0.318	-0.189	-0.055	0.419
16	Marketing	0.376	0.350	-0.760	0.044	0.843
17	Advanced Software	0.820	0.025	-0.366	0.042	0.809
	Variance	5.4715	2.7269	2.0134	1.9691	12.1808
	% Var	0.322	0.160	0.118	0.116	0.717

Annexure B
Table B1.
Factor Loadings and Communalities.

Horizontal Collaboration			
a)	Cooperation with other individual firms in the cluster on a one-to-one basis.		
	Sub-Items	Yes	No
i.	Solving production and quality related problems.	1	0
ii.	Jointly conducting trials and improvements.	1	0
iii.	Adaptations and improvements in production processes.	1	0
iv.	Adaptations of products to changing market needs.	1	0
v.	Installing and adopting machines and tools.	1	0
b)	Cooperation brought about due to the initiatives taken by the industry associations.		
	Sub-Items	Yes	No
i.	Solving production and quality related problems.	1	0
ii.	Jointly conducting trials and improvements.	1	0
iii.	Adaptations and improvements in production processes.	1	0
iv.	Adaptations of products to changing market needs.	1	0
v.	Installing and adopting machines and tools.	1	0
Vertical Collaboration			
a)	Cooperation with local suppliers and sub-contractors.		
	Sub-Items	Yes	No
i.	Solving production and quality related problems.	1	0
ii.	Jointly conducting trials and improvements.	1	0
iii.	Adaptations and improvements in production processes.	1	0
iv.	Adaptations of products to changing market needs.	1	0
v.	Installing and adopting machines and tools.	1	0
b)	Cooperation with external suppliers.		
	Sub-Items	Yes	No
i.	Solving production and quality related problems.	1	0
ii.	Jointly conducting trials and improvements.	1	0
iii.	Adaptations and improvements in production processes.	1	0
iv.	Adaptations of products to changing market needs.	1	0
v.	Installing and adopting machines and tools.	1	0
c)	Cooperation with customers.		
	Sub-Items	Yes	No
i.	Solving production and quality related problems.	1	0
ii.	Jointly conducting trials and improvements.	1	0
iii.	Adaptations and improvements in production processes.	1	0
iv.	Adaptations of products to changing market needs.	1	0
v.	Installing and adopting machines and tools.	1	0