THE RELATIONSHIPS OF MANUFACTURING PRACTICES, KNOWLEDGE TRANSFER, ORGANIZATIONAL CAPABILITIES TOWARDS MANUFACTURING CAPABILITIES:MODERATING EFFECT OF TRAINING ACROSS INDUSTRIES IN NORTHERN REGION OF MALAYSIA

By

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ABSTRACT

Malaysia is one of the countries which focus on the manufacturing sector to get income. That is why manufacturing capabilities are an important factor in running and developing a business. Therefore, this study aimed to identify the relationship between the factors that ensure that the manufacturing companies in Malaysia can survive among similar companies in the industry. The factors identified in this study are manufacturing practices, knowledge transfer, organization capability and manufacturing capabilities. Training is a moderating variable in this study. Through a mail survey, a total of 119 companies representing a variety of industries provided feedback. The hypothesis was tested using correlations and regression techniques. These findings support the hypothesis. The multiple regression analysis showed that there were significant correlations between the factors in each of the criteria for manufacturing capabilities. The hierarchical multiple regression analysis was conducted to test the role of the moderating variable in the relationship between the independent variables and the dependent variable. The hierarchical multiple regression results showed that training moderated and enhanced the companies to compete with others. To examine the relationship between manufacturing capabilities, manufacturing practices, knowledge transfer in manufacturing, organization capabilities and training, this research used a technology adoption theory - the Resource-based Theory. The research framework consisted of the following: four manufacturing practices, three knowledge transfer in manufacturing, two organization capabilities, three training as a moderating variables, and four manufacturing capabilities. This research used an adopted survey with a 5-

point- Likert-scale. To analyze data, SPSS version 19.0 was used to examine the path of relationships between the variables. This study will be beneficial to the shareholders and the directors of the companies to enhance their manufacturing capabilities to keep them relevant to the manufacturing industries

ABSTRAK

Malaysia menjadi salah satu negara yang memfokuskan kepada bidang pembuatan sebagai salah satu sumber ekonomi negara. Oleh itu keupayaan pembuatan adalah salah satu faktor penting yang perlu diberi perhatian dalam menjalankan serta mengembangkan perniagaan. Justeru, kajian ini bertujuan untuk mengenal pasti hubungan antara faktor – faktor yang membolehkan syarikat-syarikat di Malaysia terus bersaing. Antara faktor yang dikenal pasti adalah amalan pembuatan, pemindahan pengetahuan, keupayaan organisasi dan keupayaan pengeluaran. Selain itu, faktor latihan menjadi faktor penaik dalam kajian ini. Tinjauan melalui pos telah dilakukan dan sejumlah 119 syarikat yang mewakili pelbagai industri memberi maklum balas. Hipotesis yang terlibat telah diuji menggunakan teknik korelasi dan regresi. Hasil kajian ini menyokong semua hipotesis. Analisis regresi berganda dijalankan bagi menguji hubungan pembolehubah bebas dengan pembolehubah bersandar. Keputusan regresi berganda hierarki menunjukkan bahawa latihan dapat meningkatkan hubungan untuk bersaing dengan pesaing lain. Kajian ini menggunakan teori penggunaan teknologi berasaskan sumber untuk melihat hubungan keupayaan pembuatan, amalan pembuatan, perkongsian pengetahuan dalam pembuatan, keupayaan organisasi dan latihan. Rangka kerja kajian ini termasuk empat amalan pembuatan, tiga perkongsian pengetahuan dalam pembuatan, dua keupayaan organisasi, tiga latihan sebagai pembolehubah sederhana dan empat keupayaan pembuatan. Kajian ini turut menggunakan kajian dengan berskala likert 5- mata. Bagi menganalisis data, kaedah SPSS versi 19.0 digunakan untuk memeriksa perhubungan di antara pembolehubah. Hasil kajian ini memberi manfaat

kepada pemegang saham dan pengarah syarikat-syarikat untuk meningkatkan keupayaan pembuatan bagi memastikan mereka sentiasa relevan dalam industri pembuatan.

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LIST OF ABBREVIATIONS

i.	MIDA	Malaysian Industrial Development Authority
ii.	SME	Small Medium Entrepreneur
iii.	RBV	Resource Based View
iv.	ICT	Information and Communication Technology
v.	GDP	Gross Domestic Products
vi.	NIE	Newly-Industrialized Economy
vii.	R&D	Research and Development
viii.	CAD	Computer Aided Design
ix.	ASRS	Automated Storage and Retrieval System
x.	OTD	On Time Delivery
xi.	OFLT	Order Fulfillment Lead Time
xii.	IPD	Integrated Product Development
xiii.	CD-I	Computer Designed Interactive
xiv.	FMM	Federation of Malaysian manufacturers
xv.	SPSS	Statistical Package for The Social Science
xvi.	KMO	Kaiser-Meyer-Olkin
xvii.	SMIDEC	Small and Medium Industries Development Corporation

CHAPTER 1

INTRODUCTION

This chapter is consists of six major sections namely (i) background of study (ii) statement of research problem (iii) research objectives (iv) contribution of the study (v) scope of study and (vi) thesis structure. The purpose of this first chapter is to introduce the context of the research and the structure of the thesis, which explains briefly the contents of the subsequent chapters.

1.9 **Research Background**

Malaysia is an upper-middle income economy with a gross national income of USD 7,900 per capita. It is a highly open economy (exports comprise almost 100 percent of GDP) and a leading exporter of electrical appliances, electronic parts and components, palm oil, and natural gas. Malaysia is also externally competitive, ranking 18th (out of 135 economies) in the International Finance Corporation 2012 ranking of ease of doing business in the world.

The contents of the thesis is for internal user only

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APPENDIX A

Manufacturing Capability Measures

Factors	Questions used	Sources
Integration	1. Able to introduce and manufacture new products quickly 2. Able to quickly learn new skills and adopt new processes 3. Able to easily adjust processes to incorporate products design changes or special needs 4. Able to adjust smoothly to changes in product mix over the long term	Haifeng et. al. (2006) Swink & Hegarty (1998) Li (2000)
Acuity	1. Able to assist internal groups in problem solving (e.g. in new product development, design for manufacturability, quality improvement, etc) 2. Able to assist customers in problem solving (e.g. in new product development, design for manufacturability, quality improvement, etc) 3. Able to furnish critical data on product performance to internal groups 4. Able to furnish critical data on product performance to external customers 5. Able to furnish critical data on process parameters to internal groups 6. Able to furnish critical data on process parameters to external customers 7. Able to furnish critical data on cost to internal groups 8. Able to furnish critical data on cost to external customers	Li (2000) Swink & Hegarty (1998) Haifeng et. al. (2006)

	9. Able to enhance sales and marketing by exhibiting technology, equipment, or production systems in a way that conveys the value or quality of manufacturing capabilities	
Control	1. Able to understand manufacturing process capability limits and sources of variation 2. Able to monitor process outputs 3. Able to compare process output with desired outputs 4. Able to determine the causes of adverse effects in manufacturing outcomes 5. Able to remedy undesired variations in manufacturing outcomes	Swink & Hegarty (1998) Li (2000) Haifeng et. al. (2006)
Agility	1. Able to efficiently produce wide ranges in the demanded volumes of products 2. Able to manufacture a variety of products, over a short time span, without modifying facilities 3. Able to accelerate or decelerate the rate of production quickly to handle large fluctuations in demand	Swink & Hegarty (1998) Li (2000) Haifeng et. al. (2006)

APPENDIX B
Manufacturing Practices Measures

Factors	Questions used	Sources
Time-based management	1. Indicate the important given to delivery time 2. Indicate the important given to engineering	Sohal et. al. (1999) Li (2000)

	time 3. Indicate the important given to procurement 4. Indicate the important given to set-up time 5. Indicate the important given to throughput time 6. Indicate the important given to time to market 7. Indicate the important given to bottleneck identification	Bolden et. al. (1997)
Management practices	Supplier delivery to shop floor Supplier certification Set-up time reduction Process changeover time reduction Manufacturing resources planning Just-in-time Eectronic work order management Electronic data interchange Distribution resource planning	Sohal et. al. (1999) Mullarkey et. al. (1995) Haifeng et. al. (2006) Bolden et. al. (1997)
Team work	Team mandates included quality Team mandates included efficiency Team mandates included cost control Team mandates included safety Team mandates included product improvement Team mandates included customer service Team mandates included hygiene	Sohal et. al. (1999) Bolden et. al. (1997)
Manufacturing technology	Company use computer-controlled machinery Company use programmable logic controllers Company use computer controlled processes Company use real-time process measurement Company use real-time production monitoring Company use bar coding Company use multi-task machinery Company use automated testing Company use robotics Company use automated warehousing technology	Sohal et. al. (1999) Haifeng et. at (2006) Bolden et. al. (1997)

APPENDIX C

Knowledge Transfer Measures

Factors	Questions used	Sources
Knowledge Sharing	1. Share understanding among product development member of customer need,suppliers. 2. Continues intellectual work and product Development 3. Contact customer and understand needs of customer and customer satisfaction. 4. Commitment to inform,translate,and educate through listening and learning which increase job performance and quality of work in department.	Narver and Slater(1990); Calantone(1996), Hahn(1990) Deshpande(1993) Slater and Narver(1994) Grey(1996)
Learning ability	1. Ready to learn 2. Shows interest in acquiring the skills to learn 3. Involement in learning activities 4. Self-development 5. Independencent learning 6. Role interdependence 7. Interest in teamwork 8. Self motivated 9. Has achieved independence as a learner 10. Has developed a questioning approach 11. Demonstrates autonomy at a group and individual level	West P.(2000) West P. & Burnes B. (2000) Burnes B(2000)
Knowledge Management	1. Employees shared knowledge inside the company through interaction 2. Employees shared knowledge with outsider 3. Skilled employees share their experience with customers in exhibitions or conference	Ismail and Sarif (2006) Ferrari and Toledo (2004)

	without any reward 4. Monetary rewards motivated the employees to share their knowledge. 5. Learning from the past experiences 6. Learning by the performance analysis 7. Learning by training	

APPENDIX D

Training Measure

Factors	Questions used	Sources
Training for new work structure	Basic skills (reading, writing etc.) Leader training Life skill (stress management) Problem solving Product knowledge Quality skills Technical skills	Sohal et. al. (1999) Bolden et. al. (1997) Saunders (2000)
Training for co-makership	Can master several skills Can cope new process and product technology Can function as team members Can contribute and adopt new form of leadership Effects and specialize in product development department Can improve communication between product development and product department New attitudes New methods of international communication New capabilities(knowledge,cultures,languages) Can put into practices the concepts of strategic Sourcing 11. Can developt a structural towards continous improvement process which support strategic sourcing	Sohal et. al. (1999) Bolden et. al. (1997) Marsh (1999)
New method and approaches for learning while working	Introduce new methods using technologies define and expense of teaching task install open learning centres in manufacturing plants use interactive CD-I or other multimedia system	Sohal et. al. (1999) Bolden et. al. (1997) MacNeil (2000)

APPENDIX E

Organization Capabilities Measures

Factors	Questions used	Sources
ORGANIZATION LEARNING CAPABILITY		
Managerial Commitment	1. My Firm frequently involves their staff in important decision-making process 2. My firm's management looks favorably on carrying out changes in any area to adapt and/or keep ahead of new environmental situations. 3. Employee learning capability is considered a key factor in my firm. 4. My firm rewarded work innovative ideas.	Einkelenboom(2011) Eider & Igbaria(2001) Kearns(2006) Lai & Mahapatra(2004) Meade & Liles(1997)
Systems Perspectives	1 All employees have generalized knowledge regarding this firm's objectives. 2 All parts that make up my firm (departments, sections, work teams and individuals) are well aware of how they contribute to achieving the overall objectives. 3 All activities that occur in business transaction processes are clearly defined 4 All parts that make up my firm are interconnected, working together in a coordinated fashion.	Meade & Liles(1997) Valle-Cabrera (2005), Teo *et al*.(2006) Lee & Kim (2007),
Openness and Experimentation	1. My firm promotes experimentation and innovation as a way of improving the work processes. 2. My firm follows up what other firms in the sector are doing, adopting those practices and techniques it believes to be useful and interesting. 3. Experiences and ideas provided by external sources (advisors, customers, training firms, etc.) are considered a useful instrument for my firm's learning 4. Part of my firm's culture is that employees can express their opinions and make suggestions	Hult & Ferrell(1997) Jerez-Gomez *et al*(2005) Lin & Lee(2005)

	regarding the procedures and methods in place for carrying out tasks.	
INNOVATIVE CAPABILITY		
Perceived relative advantage	1. Provide better products or service 2. Enhance business efficiency 3. Increase profit capability 4. Enhance staff productivity 5. Reduce cost of operation management	Fruhling & Siau(2007) Hsu(2006) Chang & Lee(2008) Rogers (2003)
Perceived compatibility	1. Is acceptable to corporate culture and value system 2. Does not contradict the current internal technology 3. Accord with demand 4. Is supported by the existing infrastructure	Lin, Chen and Chiu (2010) Sia, Teo, Tan, & Wei (2004) Verhoef & Langerak, (2001)

THE RELATIONSHIP OF MANUFACTURING PRACTICES, KNOWLEDGE TRANSFER.ORGANIZATIONAL CAPABILITIES TOWARDS MANUFACTURING CAPABILITIES: MODERATING EFFECT OF TRAINING IN NORTHERN REGION OF MALAYSIA

The information given in this questionnaire will remain strictly confidential.

Dear respondent,

It is not necessary to identify your name or company. However, if you would like for us to send you feedback, you may fill the following section or you may attach your business card.

Thank you for your cooperation.

Name :

_____

_____

Job title:

_____

_____

Address of company:

_____

_____

_____

PART I

In this part we would like to obtain information about your company.

Company Profile

1. Which of the followings best describes the company's main sector of business:

   ☐ Agriculture, Forestry & Fishing ☐ Manufacturing

   ☐ Mining & Quarrying ☐ Construction

   ☐ Services ☐ Others: Please specify _____

2. Is the company a _____

   ☐ Malaysian owned ☐ Foreign owned

   ☐ Multi National Company ☐ Joint Venture

   ☐ Others: Please specify _____

3. Size of the company (approximate number of employees)

   ☐ Less than 5 ☐ 5-50

   ☐ 51-150 ☐ More than 150

Department Information

1. You are in Department?(Example: Department: Engineering)

   _____

2. How long have you work for your company?
   _____ years (estimate)

   ☐ Less than 1 year ☐ 1- 5 years

   ☐ 6 – 10 years ☐ More than 10 years

Part II MANUFACTURING PRACTICES

Using the table below, please rate the level of your firm application on the manufacturing practices. Circle your answer.

	Task	Degree of application 5. Fully applied 4. Partially applied 3. Less applied 2. Not applied 1. Not applicable				
	TIME-BASED MANAGEMENT					
1	indicate the importance given to delivery time	5	4	3	2	1
2	indicate the importance given to engineering time	5	4	3	2	1
3	indicate the importance given to procurement	5	4	3	2	1
4	indicate the importance given to set-up time	5	4	3	2	1
5	indicate the importance given to throughput time	5	4	3	2	1
6	indicate the importance given to time to market	5	4	3	2	1
7	indicate the importance given to bottleneck identification	5	4	3	2	1
	MANAGEMENT PRACTICES					
1	supplier delivery to shop floor	5	4	3	2	1
2	supplier certification	5	4	3	2	1
3	set-up time reduction	5	4	3	2	1
4	process changeover time reduction	5	4	3	2	1
5	manufacturing resources planning	5	4	3	2	1
6	just-in-time	5	4	3	2	1
7	electronic work order management	5	4	3	2	1
8	electronic data interchange	5	4	3	2	1
9	distribution resource planning	5	4	3	2	1
	TEAM WORK					
1	team mandates included quality	5	4	3	2	1
2	team mandates included efficiency	5	4	3	2	1
3	team mandates included cost control	5	4	3	2	1
4	team mandates included safety	5	4	3	2	1
5	team mandates included product improvement	5	4	3	2	1
6	team mandates included customer service	5	4	3	2	1
7	team mandates included hygiene	5	4	3	2	1
	MANUFACTURING TECHNOLOGY					
1	company use computer-controlled machinery	5	4	3	2	1
2	company use programmable logic controllers	5	4	3	2	1
3	company use computer controlled processes	5	4	3	2	1

4	company use real-time process measurement	5	4	3	2	1
5	company use real-time production monitoring	5	4	3	2	1
6	company use bar coding	5	4	3	2	1
7	company use multi-task machinery	5	4	3	2	1
8	company use automated testing	5	4	3	2	1
9	company use robotics	5	4	3	2	1
10	company use automated warehousing technology	5	4	3	2	1

PART III KNOWLEDGE TRANSFER

Using the table below, please rate the commitment level of your company in applying the knowledge. Circle your answer

	Task	Degree of application 5. Fully applied 4. Partially applied 3. Less applied 2. Not applied 1. Not applicable				
	KNOWLEDGE SHARING					
1	the employees have SPM certificate	5	4	3	2	1
2	the employees have Diploma certificate	5	4	3	2	1
3	the employees have bachelor degree certificate	5	4	3	2	1
4	the employees have vocational certificate	5	4	3	2	1
	LEARNING ABILITY					
5	employees shared knowledge inside the company through interaction	5	4	3	2	1
6	skilled employees share their experience with customers in exhibitions or conference without any reward	5	4	3	2	1
7	monetary rewards motivated the employees to share their knowledge.	5	4	3	2	1
8	learning from the past experiences	5	4	3	2	1
9	learning by the performance analysis	5	4	3	2	1
10	learning by training	5	4	3	2	1
11	encourage experienced workers to transfer their knowledge to less experiences workers	5	4	3	2	1
12	capture and use knowledge obtained from other private companies (e.g. competitors, customers or suppliers)	5	4	3	2	1
13	off-site training	5	4	3	2	1
14	dedication of time to capture and share knowledge	5	4	3	2	1
15	use information technology	5	4	3	2	1
	KNOWLEDGE MANAGEMENT					
16	provide informal training related to knowledge acquisition and sharing	5	4	3	2	1

17	share knowledge through the physical organization of workplace	5	4	3	2	1
18	share knowledge through written documentation	5	4	3	2	1
19	creates a value system or culture to promote knowledge sharing	5	4	3	2	1
20	encourage workers to participate in project teams with external experts	5	4	3	2	1
21	use partnerships or strategic alliances to acquire knowledge	5	4	3	2	1
22	has policies or program intended to improve worker retention	5	4	3	2	1

PART IV TRAINING

Using the table below, please rate the commitment level of your company in applying the training. Circle your answer.

	Task	Degree of application 5. Fully applied 4. Partially applied 3. Less applied 2. Not applied 1. Not applicable				
	TRAINING FOR NEW WORK STRUCTURE					
1	basic skills (reading, writing etc.)	5	4	3	2	1
2	leader training	5	4	3	2	1
3	life skill (stress management)	5	4	3	2	1
4	problem solving	5	4	3	2	1
5	product knowledge	5	4	3	2	1
6	quality skills	5	4	3	2	1
7	technical skills	5	4	3	2	1
	TRAINING FOR CO-MAKERSHIP					
8	master several skills	5	4	3	2	1
9	can cope new process and product technology	5	4	3	2	1
10	can function as team members	5	4	3	2	1
11	can contribute and adopt new form of leadership	5	4	3	2	1
12	understand and analyse process they are working and develop idea for improvement	5	4	3	2	1
13	effects of specialization in product development department	5	4	3	2	1
14	can improve communications between product development and production department	5	4	3	2	1
15	Adopt new attitudes	5	4	3	2	1
16	Adopt new methods of international communication	5	4	3	2	1
17	Adopt new capabilities(knowledge of other cultures and languages)	5	4	3	2	1
18	can put into practice the concepts of strategic sourcing	5	4	3	2	1
19	can developt a structural towards continous improvement	5	4	3	2	1

	process which support strategic sourcing					
	NEW METHOD AND APPROACHES FOR LEARNING WHILE WORKING					
20	Introduce new methods using new technologies	5	4	3	2	1
21	define and expanse of teaching tasks	5	4	3	2	1
22	open learning centres in manufacturing plants	5	4	3	2	1
23	use interactive CD(CD-I) or other multimedia systems	5	4	3	2	1

<u>PART VI</u> ORGANIZATION CAPABILITY

Using the table below, please indicate your perception on the following capability of your company. Circle your answer.

	Statements	Degree of implementation 5. High implementation 4. Average implementation 3. Uncertain 2. Low implementation 1. No implementation				
	ORGANIZATION LEARNING CAPABILITY (Managerial Commitment)					
1	My Firm frequently involves their staff in important decision-making process	5	4	3	2	1
2	My firm's management looks favorably on carrying out changes in any area to adapt and/or keep ahead of new environmental situations.	5	4	3	2	1
3	Employee learning capability is considered a key factor in my firm.	5	4	3	2	1
4	My firm rewarded work innovative ideas.	5	4	3	2	1
	(Systems Perspectives)					
1	All employees have generalized knowledge regarding this firm's objectives.	5	4	3	2	1
2	All parts that make up my firm (departments, sections, work teams and individuals) are well aware of how they contribute to achieving the overall objectives.	5	4	3	2	1
3	All activities that occur in business transaction processes are clearly defined	5	4	3	2	1
4	All parts that make up my firm are interconnected, working together in a coordinated fashion.	5	4	3	2	1
	(Openness and Experimentation)					
1	My firm promotes experimentation and innovation as a way of improving the work processes.	5	4	3	2	1
2	My firm follows up what other firms in the sector are doing, adopting those practices and techniques it believes to be useful and interesting.	5	4	3	2	1

3	Experiences and ideas provided by external sources (advisors, customers, training firms, etc.) are considered a useful instrument for my firm's learning	5	4	3	2	1
4	Part of my firm's culture is that employees can express their opinions and make suggestions regarding the procedures and methods in place for carrying out tasks.	5	4	3	2	1
	Innovation capabilities (Perceived relative advantage)					
1	Provide better products or service	5	4	3	2	1
2	Enhance business efficiency	5	4	3	2	1
3	Increase profit capability	5	4	3	2	1
4	Enhance staff productivity	5	4	3	2	1
5	Reduce cost of operation management	5	4	3	2	1
	Perceived compatibility					
1	Is acceptable to corporate culture and value system	5	4	3	2	1
2	Does not contradict the current internal technology	5	4	3	2	1
3	Accord with demand	5	4	3	2	1
4	Is supported by the existing infrastructure	5	4	3	2	1

PART VI MANUFACTURING CAPABILITY

Using the table below, please indicate your perception on the following capability of your company. Circle your answer.

	Statements	Degree of implementation 5. High implementation 4. Average implementation 3. Uncertain 2. Low implementation 1. No implementation				
	IMPROVEMENT					
1	able to impel human resource to higher levels of effort and effectiveness	5	4	3	2	1
2	able to increase and apply process understanding	5	4	3	2	1
3	able to identify and remove non-value adding activities	5	4	3	2	1
	INNOVATION					
4	able to identify problems inside the organization	5	4	3	2	1
5	able to identify problems outside the organization	5	4	3	2	1
6	able to identify process needs inside the organization	5	4	3	2	1
7	able to identify process needs outside the organization	5	4	3	2	1
8	able to generate and evaluate new ideas which meet organizational objectives	5	4	3	2	1
9	able to apply new technologies or methods to solve problems	5	4	3	2	1
	INTEGRATION					
10	able to introduce and manufacture new products quickly	5	4	3	2	1

11	able to quickly learn new skills and adopt new processes	5	4	3	2	1
12	able to easily adjust processes to incorporate products design changes or special needs	5	4	3	2	1
13	able to adjust smoothly to changes in product mix over the long term	5	4	3	2	1
	ACUITY					
14	able to assist internal groups in problem solving (e.g. in new product development, design for manufacturability, quality improvement, etc)	5	4	3	2	1
15	able to assist customers in problem solving (e.g. in new product development, design for manufacturability, quality improvement, etc)	5	4	3	2	1
16	able to furnish critical data on product performance to internal groups	5	4	3	2	1
17	able to furnish critical data on product performance to external customers	5	4	3	2	1
18	able to furnish critical data on process parameters to internal groups	5	4	3	2	1
19	able to furnish critical data on process parameters to external customers	5	4	3	2	1
20	able to furnish critical data on cost to internal groups	5	4	3	2	1
21	able to furnish critical data on cost to external customers	5	4	3	2	1
22	able to enhance sales and marketing by exhibiting technology, equipment, or production systems in a way that conveys the value or quality of manufacturing capabilities	5	4	3	2	1
	CONTROL					
23	able to understand manufacturing process capability limits and sources of variation	5	4	3	2	1
24	able to monitor process outputs	5	4	3	2	1
25	able to compare process output with desired outputs	5	4	3	2	1
26	able to determine the causes of adverse effects in manufacturing outcomes	5	4	3	2	1
27	able to remedy undesired variations in manufacturing outcomes	5	4	3	2	1
	AGILITY					
28	able to efficiently produce wide ranges in the demanded volumes of products	5	4	3	2	1
29	able to manufacture a variety of products, over a short time span, without modifying facilities	5	4	3	2	1
30	Able to accelerate or decelerate the rate of production quickly to handle large fluctuations in demand	5	4	3	2	1
	RESPONSIVE					
31	able to accommodate raw material substitutions or variations	5	4	3	2	1
32	able to change product sequencing/loading in response to machine/equipment problems	5	4	3	2	1
33	able to rearrange the order in which parts are fed into the manufacturing process, because of changes in parts and raw material deliveries or changes in customer delivery	5	4	3	2	1

	requirements					
34	able to expedite or reroute shipments to accommodate special circumstances without loss time	5	4	3	2	1

PART VI

To improve manufacturing capabilities towards manufacturing practices,knowledge and training, are there any other advices you would like to share with us. Please write as many comments possible in the provided space

THANK YOU FOR YOUR TIME AND COOPERATION

APPENDIX G : FACTOR ANALYSIS

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.559
Bartlett's Test of Sphericity	Approx. Chi-Square	224.194
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
involve	1.000	.318
favorably	1.000	.134
learn	1.000	.896
rewarded	1.000	.853

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.202	55.053	55.053	2.202	55.053	55.053
2	.964	24.102	79.155			
3	.742	18.555	97.710			
4	.092	2.290	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix(a)

	Component
	1
involve	.564
favorably	.367
learn	.947
rewarded	.924

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix(a)

a Only one component was extracted. The solution cannot be rotated.

APPENDIX H : MULTIPLE REGRESSION ANALYSIS

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	orggg, cMP, cKTT(a)	.	Enter

a All requested variables entered.
b Dependent Variable: manc_agility

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.908(a)	.824	.820	.27030

a Predictors: (Constant), orggg, cMP, cKTT
b Dependent Variable: manc_agility

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.

1	Regression	39.361	3	13.120	179.584	.000(a)
	Residual	8.402	115	.073		
	Total	47.763	118			

a Predictors: (Constant), orggg, cMP, cKTT
b Dependent Variable: manc_agility

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.609	.311		-5.172	.000
	cMP	.393	.083	.329	4.737	.000
	cKTT	.819	.091	.628	8.972	.000
	orggg	.042	.041	.042	1.016	.312

a Dependent Variable: manc_agility

Casewise Diagnostics(a)

Case Number	Std. Residual	manc_agility	Predicted Value	Residual
30	3.087	4.00	3.1657	.83429
60	3.071	4.00	3.1699	.83009
90	3.071	4.00	3.1699	.83009

a Dependent Variable: manc_agility

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.5231	4.4914	3.6555	.57755	119
Std. Predicted Value	-1.961	1.447	.000	1.000	119
Standard Error of Predicted Value	.030	.083	.048	.012	119
Adjusted Predicted Value	2.5347	4.4762	3.6543	.57856	119
Residual	-.54704	.83429	.00000	.26684	119
Std. Residual	-2.024	3.087	.000	.987	119
Stud. Residual	-2.038	3.185	.002	1.007	119
Deleted Residual	-.55480	.88825	.00116	.27788	119
Stud. Deleted Residual	-2.067	3.321	.005	1.023	119
Mahal. Distance	.423	10.212	2.975	2.025	119
Cook's Distance	.000	.177	.010	.027	119
Centered Leverage Value	.004	.087	.025	.017	119

a Dependent Variable: manc_agility

APPENDIX I : HIERARCHICAL MULTIPLE REGRESSION ANALYSIS

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	cORG, cKTT, cMP(a)	.	Enter
2	cTRA(a)	.	Enter
3	OCXT, MPXT, KTXT(a)	.	Enter

a All requested variables entered.
b Dependent Variable: cMC

Model Summary(d)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.911(a)	.830	.826	.24696	.830	187.628	3	115	.000

2	.920(b)	.846	.840	.23645	.015	11.448	1	114	.001
3	.920(c)	.847	.837	.23867	.001	.298	3	111	.827

a Predictors: (Constant), cORG, cKTT, cMP
b Predictors: (Constant), cORG, cKTT, cMP, cTRA
c Predictors: (Constant), cORG, cKTT, cMP, cTRA, OCXT, MPXT, KTXT
d Dependent Variable: cMC

ANOVA(d)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.331	3	11.444	187.628	.000(a)
	Residual	7.014	115	.061		
	Total	41.344	118			
2	Regression	34.971	4	8.743	156.368	.000(b)
	Residual	6.374	114	.056		
	Total	41.344	118			
3	Regression	35.022	7	5.003	87.831	.000(c)
	Residual	6.323	111	.057		
	Total	41.344	118			

a Predictors: (Constant), cORG, cKTT, cMP
b Predictors: (Constant), cORG, cKTT, cMP, cTRA
c Predictors: (Constant), cORG, cKTT, cMP, cTRA, OCXT, MPXT, KTXT
d Dependent Variable: cMC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.234	.295		-4.189	.000
	cMP	.477	.076	.430	6.255	.000
	cKTT	.651	.083	.537	7.869	.000
	cORG	.058	.044	.053	1.330	.186
2	(Constant)	-1.560	.298		-5.234	.000
	cMP	.415	.075	.373	5.500	.000
	cKTT	.634	.079	.523	7.986	.000
	cORG	-.037	.050	-.034	-.732	.466
	cTRA	.232	.069	.156	3.383	.001
3	(Constant)	-.824	2.938		-.281	.780
	cMP	.618	.810	.556	.762	.447
	cKTT	.160	1.074	.132	.148	.882
	cORG	.057	.134	.052	.421	.674

	cTRA	.081	.661	.054	.122	.903
	MPXT	-.048	.192	-.257	-.253	.801
	KTXT	.108	.250	.548	.430	.668
	OCXT	-.023	.027	-.146	-.862	.391

a Dependent Variable: cMC

Excluded Variables(c)

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	cTRA	.156(a)	3.383	.001	.302	.634
	MPXT	.303(a)	3.353	.001	.300	.166
	KTXT	.283(a)	3.396	.001	.303	.194
	OCXT	.209(a)	2.453	.016	.224	.194
2	MPXT	.030(b)	.046	.963	.004	.003
	KTXT	.225(b)	.282	.778	.027	.002
	OCXT	-.140(b)	-.839	.403	-.079	.049

a Predictors in the Model: (Constant), cORG, cKTT, cMP
b Predictors in the Model: (Constant), cORG, cKTT, cMP, cTRA
c Dependent Variable: cMC

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.6182	4.5219	3.7185	.54479	119
Std. Predicted Value	-2.020	1.475	.000	1.000	119
Standard Error of Predicted Value	.032	.096	.060	.014	119
Adjusted Predicted Value	2.6404	4.5077	3.7183	.54437	119
Residual	-.54005	.55182	.00000	.23148	119
Std. Residual	-2.263	2.312	.000	.970	119
Stud. Residual	-2.390	2.437	.000	1.006	119
Deleted Residual	-.60263	.61313	.00016	.24896	119

Stud. Deleted Residual	-2.443	2.494	-.001	1.018	119
Mahal. Distance	1.195	18.248	6.941	3.564	119
Cook's Distance	.000	.083	.010	.019	119
Centered Leverage Value	.010	.155	.059	.030	119

a Dependent Variable: cMC