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INTERNAL AND EXTERNAL BARRIERS TO EFFECTIVE SUPPLY CHAIN MANAGEMENT IMPLEMENTATION IN MALAYSIAN MANUFACTURING COMPANIES: A PRIORITY LIST BASED ON VARYING DEMOGRAPHIC PERSPECTIVES

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ABSTRACT

Identifying and prioritizing internal and external barriers to supply chain management (SCM) is crucial, especially in a developing country context like Malaysia, where challenges often stem from limited awareness and unclear objectives within the supply chain network. This study thus aims to compare the ranking of various demographic groups in relation to the internal and external barriers experienced by Malaysian manufacturing companies, a topic that has received minimal attention. The identified lists of internal and external barriers are prioritised using the Analytic Hierarchy Process (AHP) from ten respondents with wide-ranging experience in SCM. The ranking of the respondents from different races, age groups, education levels, employment types, work experience, and designations suggests significant variations between these groups in terms of the ranking of internal and external barriers. The findings of this research provide significant information to company managers who desire to implement SCM in a multi-cultural setting such as Malaysia. The onus is on these managers to be cautious in developing a strategic plan for its effective SCM implementation and also in designing programs to overcome SCM obstacles.

Keywords: internal barriers, external barriers, supply chain management, Analytic Hierarchy Process, demographic perspectives

INTRODUCTION

The concept of Supply Chain Management (SCM) combines the forward flow of materials and the backward flow of information (Monzouri, Ab Rahman, & Arshad, 2011). It is also typified by such activities as the flow of materials, information, products, and funds from supplier to manufacturer, to distributor, to retailer, and ultimately to the end users (Ferguson, 2000; Ali et al., 2012). Smooth implementation of SCM is required to ensure that the production process is effective, and this has provided the impetus for organisations to invest more in their Supply Chain (SC) (Manzouri et al., 2010; Mentzer, 2000). The many benefits of SCM include a reduction in inventory, improved sharing of information, increased mutual trust among supply chain partners, reduction of product life cycle, and increased customer satisfaction (Lee et al., 2011; Lee et al., 2014). Yet SCM implementation can be challenging and costly (Huo et al., 2017; Gorane & Kant, 2015; Monzouri, 2011; Manzouri, 2010; Meehan, & Muir, 2008). To fully achieve the benefits of SCM, organisations have to address these challenges and overcome both intra and inter organisational barriers that are often encountered (Gorane & Kant, 2015).

Intra-organisational SCM barriers are internal challenges such as lack of top management support, employee empowerment and training, financial resources, information technology and infrastructure. Conversely, inter organisational are external barriers ranging from an unwillingness to share critical information, lack of collaboration between SC partners, lack of information sharing, and mistrust among SC partners (Adhikari, 2010; Subrahmanya & Rajashekhar, 2009; Asad Sadi, & Al-Dubaisi, 2008). Most of the SCM literature to date has identified and provided useful explications of SCM barriers, but currently, limited studies have been carried out to rank or prioritised the barriers (Islam, & Anis, 2018). Specifically, very little is known about prioritising the barriers based on different demographic perspectives in a Malaysian context and identifying the most urgent barriers to be

addressed. This paper studies Malaysian manufacturing companies and specifically attempts to rank and prioritise the barriers to SCM implementation according to different demographic perspectives. The well-known decision-making tool, the Analytic Hierarchy Process (AHP), is used for this purpose.

Supply Chain Management

In order to allow a detailed analysis of SCM implementation, Palmer and Shah (2016) developed a comprehensive framework for SCM implementation that breaks down the process into four stages, as illustrated in Figure 1. The diagram shows that SCM implementation comprises strategic management initiatives and the factors that drive its implementation, such as customer demand, competition, economics and technology, performance outcomes, and the barriers disrupting the implementation of SCM. These barriers include a lack of top management support, unwillingness to share information, and reluctance to share risks among SC partners.

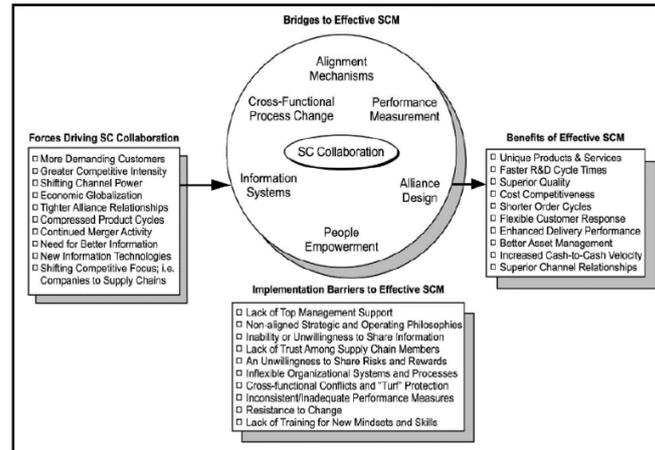


Figure 1: A framework for SCM implementation (Palmer & Shah, 2016)

Barriers to SCM

This section will discuss the classification of the various internal and external barriers that prevent companies from implementing effective SCM (Meehan & Muir, 2008). To achieve optimal benefits, managers and business owners must understand and manage the barriers well so that the obstacles can be accurately and timely resolved (Ravi, et al., 2005). Internal SCM barriers stem from limited support from management, inadequate employee empowerment and training, insufficient funds, and an inferior information technology base. Additionally, problems between organisations and partners related to their refusal to share vital information, lack of trust and non-collaboration represent the external barriers to SCM (Adhikari, 2010; Subrahmanya & Rajashekhar, 2009; Asad & Al-Dubaisi, 2008)).

In the Malaysian context, Islam and Anis (2018) have carried out the barriers to SCM implementation in manufacturing companies. The barriers are shown in Table 1, in which the authors have categorised the barriers into internal and external.

Table 1: Internal and External Barriers in Malaysian Manufacturing Companies

Internal Barriers	External Barriers
<ul style="list-style-type: none"> ● Untrained workers ● Poor communication between management and workers ● Poor quality control ● Machine breakdown ● Wrong forecasts ● Poor delivery system ● Sloppy workers ● Inefficient layout of the factory ● No proper control of inventory 	<ul style="list-style-type: none"> ● Poor communication with suppliers ● Late delivery ● Unavailability of necessary raw materials ● Fluctuation of product demand ● Unreliable suppliers ● Poor quality raw materials ● Change in customer requirement ● Raw materials price fluctuation

- | | |
|--|--|
| | <ul style="list-style-type: none"> ● Change of technology |
|--|--|

Source: Islam and Anis (2018).

The present study will utilise the barriers discovered by Islam and Anis (2018) to produce a ranking based on varying demographic perspectives.

METHOD

This study employed the quantitative approach. Firstly, the internal and external barriers were identified through a literature review, specifically from Islam and Anis (2018). These barriers were then brought to and validated by expert academics and the relevant manufacturing industry practitioners involved in supply chain activities. Subsequently, these internal and external barriers were used to design the Analytics Hierarchy Process (AHP) survey questionnaire. The AHP data was obtained via structured interviews with five practitioners involved in supply chain activities and five expert academics in the area of SCM. These academics and practitioners were selected through a purposive sampling technique. The use of the purposive sampling technique is appropriate since the AHP requires opinions from experts possessing the necessary information.

RESULTS AND DISCUSSION

Twelve respondents were contacted, and ten agreed to participate in the study (refer to Table 2). The majority, or 40 percent (4/10) of the respondents, are Malays as well as Indians, and 70 percent (7/10) are aged 51 and above. Most of 90 percent (9/10) of the respondents are either Master's degree or Ph.D. holders. Five or 50 percent of the respondents are attached to private organisations and possess 10 to 15 years or more than 15 years of working experience. As to their designation, Table 2 shows that 50 percent (5/10) of the respondents are academics in universities as well as manufacturing industry practitioners with practical experience in supply chain activities. It can be surmised that all the respondents are credible and have sufficient expertise in organisational supply chain management.

Table 2: Demographic information of the respondents

Demographic Profile	Frequency	Percentage
Gender		
● Male	9	90.00
● Female	1	10.00
Race		
● Malay	4	40.00
● Chinese	-	-
● Indian	4	40.00
● Others	2	20.00
Age Group		
● 21 – 30 years	-	-
● 31 – 40 years	-	-
● 41 – 50 years	3	30.00
● 51 year and above	7	70.00
Educational level		
● Certificate/Diploma	1	10.00
● Bachelors	-	-
● Master's	5	50.00
● PhD	4	40.00
Type of employment		
● Public sector	4	40.00
● Private sector	5	50.00
● Others	1	10.00
Working experience		
● 1 – 5 years	-	-

● 6 – 10 years	-	-
● 10 – 15 years	5	50.00
● 15 years and above	5	50.00
Designation		
● Supply-chain manager	1	10.00
● Senior estate manager	1	10.00
● Business consultant and ● trainers	2	20.00
● Environment and safety ● consultant	1	10.00
● University Professor/Associate Professor	5	50.00

Based on data in Table 2, the study intends to investigate the ranking of internal and external barriers assigned by different demographic groups, namely race, age, education level, employment type, working experience, and designation.

Analysis Based on Different Demographic Groups

The findings are divided into two. Firstly, the ranking analysis is based on different demographic groups, namely race, age, education level, employment type, working experience, and designation. Secondly, the findings show the Rank Correlation Coefficient (RCC) results, evaluating the similarity of rankings assigned by the seven identified demographic groups as suggested by (Ho, 2008). The ranking assigned by the six groups and their corresponding priority values for internal and external barriers and the internal barrier and external barrier items are presented in Tables 3, 4, and 5, respectively (refer to Appendix 1). Data in Table 3 illustrates that all demographic groups, namely race, age, education level, employment type, working experience, and designation, show a fair amount of consensus in the ranking of internal and external barriers.

Overall, most of the demographic groups ranked the external barriers as the most important barriers compared to internal barriers, i.e., 1-2, respectively. Conversely, three demographic groups, i.e., race (others), education level (those with Master's degrees), and working experience (those possessing 15 years and more working experience), ranked internal barriers as the most important barriers as compared to external ones, i.e., 2-1. Tables 6, 7, and 8 (refer to Appendix 1) demonstrate the RCC in measuring the similarities in ranking assigned by the six demographic groups. Table 6 reveals significant similarities in the ranking of internal and external barriers by several demographic groups at a 1 percent significant level; specifically, the ranking assigned by the Malays – Indians (race), 31 to 40 years old – 41 to 50 years old (age), Certificate/Diploma – Others (education level), Public – Private, Public – Others, Private – Others (employment type) and Academic – Practitioner (designation).

Other demographic groups, on the other hand, showed a significantly different ranking for internal and external barriers, for instance, the ranking assigned by demographic groups of races (Malay – Others, Indian - Others), education level (Certificate/ Diploma – Master, Master – Others) and experience (10 to 15 years – 15 years and above). The ranking assigned by each demographic group for the internal barrier items is exhibited in Table 5. The following nine items were identified as the internal barriers to manufacturing supply chain activities: 1) untrained workers, 2) poor communication between management and workers, 3) poor quality control, 4) machine breakdowns, 5) inaccurate forecasts, 6) poor delivery systems, 7) sloppy workers, 8) inefficient layout, and 9) poor inventory control.

Table 5 reveals that the priority values and ranking differ for various demographic groups. Specifically, differences in the rankings were seen by demographic groups of races (Malay and Indian), education level (those with Certificates/ Diplomas and Master's degree as well as Certificates/ Diplomas and Other qualifications), the three employment types, i.e., Public, Private and Others and interestingly, the ranking by Academics and Practitioners (designation). The differences in ranking assigned by various demographic groups are supported by data in Table 8, which shows the RCC in measuring the similarities in ranking assigned by the six demographic groups in the present study. There are no significant similarities obtained between any demographic groups of races, age, education level, employment type, working experience, or designation, demonstrating that the ranking assigned by each

demographic group of races, age, education level, employment type, working experience, and designation are distinct.

The ranking of items for external barriers, namely 1) poor communication with suppliers, 2) late delivery, 3) unavailability of necessary raw materials, 4) fluctuation of product demand, 5) unreliable suppliers, 6) poor quality raw materials, 7) change in customer requirements 8) raw materials price fluctuation and 9) change in technology are presented in Table 5. Table 5 discloses that the ranking for external barrier items is different according to all demographic groups. Notably, divergent rankings were expressed by demographic groups of races (Indian and Others), education level (those who possess Certificates/ Diplomas and Master's degrees as well as Master's and Other qualifications), years of experience (those with 31 – 40 years and 41 to 50 years of working experience), employment type, especially for those attached to Public and Other organisations.

The RCC for items of external barriers is shown in Table 8. It was found that none of the RCC for the external barrier items was statistically significant for any combination of any demographic groups. Each demographic group, i.e., race, age, education level, employment type, working experience, and designation, has assigned different priorities for the external barrier items, indicating that each demographic group held differing perspectives in ranking the external barrier items.

CONCLUSION

Limited empirical evidence is available on the barriers involved in SCM implementation in Malaysian manufacturing companies (Subrahmanya & Rajashekhar, 2009). Studies investigating the barriers to SCM implementation among related demographic groups involved in SCM implementation are even fewer. This study provides useful information to manufacturing companies on barriers to SCM implementation in a multi-cultural setting. This is carried out by obtaining the respondents' ranking of internal and external barriers to SCM implementation according to various demographic groups, i.e., race, age group, education level, employment type, work experience, and designation. The most striking result is that the RCCs for internal and external barriers were perfectly correlated at a 1 percent significant level.

In addition, most of the demographic groups assigned external barriers as most important compared to internal barriers for successful SCM implementation in Malaysian manufacturing companies. It is apparent that none of the RCCs were statistically significant for any combination of demographic groups for the nine internal and external barrier items. This means each demographic group, namely race, age, education level, employment type, work experience, and designation, has different priorities for the nine items. This study contributes to the literature, for without understanding these perspectives and evaluating their implications, SCM implementation in a specific multi-demographic and multi-cultural scenario runs the risk of inefficient management and loss of value.

ACKNOWLEDGMENTS

The authors would like to acknowledge Universiti Teknologi MARA (UiTM), Cawangan Selangor, for providing a grant, namely Dana UiTM Cawangan Selangor (DUCS), to carry out the present research activities. The grant number is: GERAN DUCS 600 - UiTMSEL (PI.5/4) (035/2018).

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APPENDIX

Appendix 1

Table 3: Priority value and ranking for internal and external barriers by various demographic groups

Barriers	RACES						AGE				EDUCATION LEVELS					
	Malay		Indian		Others		31 – 40 years		41 – 50 years		Certificate/ diploma		Master		PhD	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Internal	0.4860	2	0.3898	2	0.6910	1	0.476	2	0.4855	2	0.1667	2	0.6607	1	0.4720	2
External	0.5140	1	0.6102	1	0.3090	2	0.5240	1	0.5145	1	0.8333	1	0.3393	2	0.5280	1

Barriers	TYPE OF EMPLOYMENT						EXPERIENCE				DESIGNATION			
	Public sector		Private sector		Others		10 – 15 years		15 years and above		Academic		Practitioners	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Internal	0.4886	2	0.4202	2	0.2	2	0.4039	2	0.5764	1	0.4909	2	0.4889	2
External	0.5114	1	0.5798	1	0.8	1	0.5961	1	0.4236	2	0.5091	1	0.5111	1

Table 4: Priority value and ranking for items of internal barrier by various demographic groups

Barriers	RACES						AGE			
	Malay		Indian		Others		31 – 40 years		41 – 50 years	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Untrained workers	0.1385	4	0.1060	4	0.1463	2	0.1219	3	0.1416	1

Poor communication mgt and workers	0.0537	9	0.2010	1	0.0647	8	0.1821	2	0.0774	9
Poor quality control	0.0631	8	0.1798	2	0.2543	1	0.2253	1	0.1141	5
Machine breakdowns	0.0792	7	0.0634	9	0.0656	7	0.0462	9	0.0678	8
Wrong forecasts	0.1521	2	0.0723	7	0.0967	5	0.0825	6	0.1220	4
Poor delivery system	0.1456	2	0.1013	5	0.0457	9	0.0976	5	0.1044	6
Sloopy workers	0.1549	1	0.1081	3	0.1283	3	0.1129	4	0.1399	2
Inefficient layout	0.1071	5	0.0671	8	0.0841	6	0.0613	8	0.1033	7
No proper control of inventory	0.1057	6	0.1009	6	0.1143	4	0.0704	7	0.1295	3

Barriers	EDUCATION LEVEL						TYPE OF EMPLOYMENT					
	Certificate/ diploma		Master		PhD		Public sector		Private sector		Others	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Untrained workers	0.0494	6	0.1522	2	0.1438	3	0.2280	1	0.0995	6	0.0867	9
Poor communication mgt and workers	0.0141	9	0.1729	1	0.0777	7	0.0812	6	0.1077	5	0.1183	4
Poor quality control	0.0270	8	0.1227	4	0.1934	1	0.1286	4	0.1543	2	0.1004	6
Machine breakdowns	0.0758	4	0.0641	9	0.0486	9	0.0446	9	0.0644	9	0.1113	5
Wrong forecasts	0.2489	2	0.0836	7	0.1016	6	0.0687	8	0.1549	1	0.1215	3
Poor delivery system	0.3359	1	0.1097	5	0.0627	8	0.0774	7	0.1248	4	0.0984	7

Sloopy workers	0.1371	3	0.1311	3	0.1102	4	0.1403	3	0.1268	3	0.0953	8
Inefficient layout	0.0739	5	0.0718	8	0.1098	5	0.0829	5	0.0826	8	0.1342	1
No proper control of inventory	0.0379	7	0.0920	6	0.1522	2	0.1483	2	0.0852	7	0.1339	2

Barriers	EXPERIENCES				DESIGNATION			
	Malay		Indian		31 – 40 years		41 – 50 years	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Untrained workers	0.1219	3	0.1478	2	0.1809	1	0.1024	6
Poor communication mgt and workers	0.1084	5	0.0988	6	0.0816	7	0.1276	4
Poor quality control	0.1881	1	0.1006	5	0.1346	3	0.1338	2
Machine breakdowns	0.0588	9	0.0622	9	0.0586	9	0.0639	9
Wrong forecasts	0.1321	2	0.0853	7	0.0961	5	0.1271	5
Poor delivery system	0.0877	8	0.1339	3	0.0773	8	0.1443	1
Sloopy workers	0.1089	4	0.1597	1	0.1279	4	0.1313	3
Inefficient layout	0.0935	7	0.0801	8	0.0942	6	0.0897	7
No proper control of inventory	0.1007	6	0.1316	4	0.1488	2	0.0798	8

Table 5: Priority value and ranking for external barriers items by various demographic groups

Barriers	RACES						AGE			
	Malay		Indian		Others		31 – 40 years		41 – 50 years	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank

Poor communication with suppliers	0.0550	8	0.1021	3	0.0650	7	0.0878	5	0.0749	7
Late delivery	0.0600	7	0.2696	1	0.0452	8	0.2644	1	0.0735	8
Unavailability of necessary raw materials	0.1537	2	0.0652	7	0.0958	4	0.0480	9	0.1472	2
Fluctuations in product demand	0.0528	9	0.0627	8	0.0933	5	0.0696	7	0.0662	9
Unreliable suppliers	0.1484	3	0.0768	4	0.0340	9	0.0715	6	0.0991	6
Poor quality raw materials	0.2375	1	0.2012	2	0.1285	3	0.1713	2	0.2239	1
Change in customer requirements	0.0854	5	0.0762	6	0.3098	1	0.1075	4	0.1148	3
Raw materials price fluctuations	0.1280	4	0.0564	9	0.0855	6	0.0647	8	0.1044	4
Change in technology	0.0792	6	0.0898	4	0.1430	2	0.1152	3	0.0960	5

Barriers	EDUCATION LEVEL						TYPE OF EMPLOYMENT					
	Certificate/ diploma		Master		PhD		Public sector		Private sector		Others	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Poor communication with suppliers	0.0326	9	0.1053	4	0.0638	9	0.0532	9	0.0968	6	0.1609	2
Late delivery	0.0211	8	0.1814	2	0.0733	7	0.0687	8	0.1356	3	0.1326	3
Unavailability of necessary raw materials	0.3607	1	0.0623	8	0.1327	4	0.1580	2	0.0981	5	0.0322	9
Fluctuation of product demand	0.0554	7	0.0572	9	0.0758	6	0.0698	7	0.0691	9	0.0449	8
Unreliable suppliers	0.0593	6	0.1278	3	0.0639	8	0.1153	3	0.0721	8	0.1216	4
Poor quality raw materials	0.0948	4	0.2406	1	0.1850	1	0.2216	1	0.1774	1	0.2584	1
Change in customer requirements	0.1877	2	0.0701	7	0.1587	2	0.0876	6	0.1541	2	0.0886	5
Raw materials price fluctuations	0.0831	5	0.0836	5	0.0979	5	0.1181	4	0.0750	7	0.0841	6
Change in technology	0.1053	3	0.0717	6	0.1488	3	0.1078	5	0.1219	4	0.0767	7

Barriers	EXPERIENCES				DESIGNATION			
	Malay		Indian		31 – 40 years		41 – 50 years	
	Normalised	Rank	Normalised	Rank	Normalised	Rank	Normalised	Rank
Poor communication with suppliers	0.0773	7	0.0884	6	0.0699	8	0.0934	5
Late delivery	0.1510	2	0.0804	7	0.0714	7	0.1602	2
Unavailability of necessary raw materials	0.0756	8	0.1516	2	0.1535	2	0.0761	8
Fluctuations in product demand	0.0681	9	0.0683	9	0.0670	9	0.0667	9
Unreliable suppliers	0.0820	6	0.1078	3	0.1012	6	0.0859	6
Poor quality raw materials	0.1900	1	0.2375	1	0.2212	1	0.2006	1
Change in customer requirements	0.1352	4	0.0920	5	0.1063	3	0.1316	3
Raw materials price fluctuations	0.0846	5	0.1003	4	0.1038	5	0.0811	7
Change in technology	0.1362	3	0.0737	8	0.1057	4	0.1045	4

Table 6: RCC of ranking for internal and external barriers by various demographic groups

RCC	RACES			AGE	EDUCATION LEVELS		
	Malay - Indian	Malay - Others	Indian - Others	31 to 40 years - 41 to 50 years	Certificate – master	Certificate - PhD	Master - PhD
	1 (0.01)*	-1 (0.01)*	-1 (0.01)*	1.00 (0.01)*	-1.00 (0.01)*	1.00 (0.01)*	-1.00 (0.01)*

RCC	TYPE OF EMPLOYMENT			EXPERIENCE	DESIGNATION
	Public-Private	Public-Others	Private-Others	10 to 15 years – 15 years and above	Academic - Practitioners
	1.00 (0.01)*	1.00 (0.01)*	1.00 (0.01)*	-1.00 (0.001)*	1.00 (0.01)*

Number in the (bracket) represents the p value of the correlation test

*Significant at 0.01 percent

Table 7: RCC of ranking for items in internal barrier by various demographic groups

RCC	RACES			AGE	EDUCATION LEVELS		
	Malay - Indian	Malay - Others	Indian - Others	31 to 40 years - 41 to 50 years	Certificate – master	Certificate - PhD	Master - PhD
	-2.17 (0.576)	0.1 (0.798)	0.283 (0.460)	0.200 (0.606)	-0.433 (0.244)	-0.483 (0.187)	0.317 (0.406)

RCC	TYPE OF EMPLOYMENT			EXPERIENCE	DESIGNATION
	Public-Private	Public- Others	Private- Others	10 to15 years – 15 years and above	Academic - Practitioners
	-0.017 (0.966)	-0.283 (0.460)	-0.283 (0.460)	0.317 (0.406)	-0.017 (0.966)

Number in the (bracket) represents the p value of the correlation test

Table 8: RCC of ranking for items in external barrier by various demographic groups

RCC	RACES			AGE	EDUCATION LEVELS		
	Malay - Indian	Malay - Others	Indian - Others	31 to 40 years - 41 to 50 years	Certificate – master	Certificate - PhD	Master - PhD
	0.008 (0.983)	0.183 (0.637)	-2.09 (0.589)	-0.067 (0.865)	-0.383 (0.308)	0.800 (0.010)	-0.117 (0.765)

RCC	TYPE OF EMPLOYMENT			EXPERIENCE	DESIGNATION
	Public-Private	Public- Others	Private- Others	10 to15 years – 15 years and above	Academic - Practitioners
	0.183 (0.637)	-0.117 (0.244)	0.433 (0.244)	0.183 (0.637)	0.383 (0.308)

Number in the (bracket) represents the p value of the correlation test