

The effects of location, capacity, technology and integration on operational flexibility: A service industry perspective

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Abstract

This is an empirical research, involving four important organizational resources, location, capacity, technology, and integration and their effects on operation flexibility. This study is done within the context of the service industry in Malaysia and South African service industries. The study employed a potent SEM PLS methods to test the relationship and predict which factor has the most influence. It is found that technology has the strongest effect on both types of operations flexibility. On the reasons behind these interesting findings, we offer managerial and theoretical justifications.

Introduction

Operations flexibility is a competitive capability for organizations competing in a crowded market. It is about the ability to be responsive to the needs of the customer. In manufacturing setting, researchers identify common flexibility concept such as routing, product, and which are considered as operations flexibility. The determinants of operations flexibility has been narrowed down to the use of operations resources, either structural or infrastructural. Among the most important ones are location, capacity, technology and integration (Boyer and McDermot, 2000). For example, technology is the enabler that provide the capability to be flexible for the changing customer need. Integration, which refer to the cooperation with players in the eco-system, should enable firms to be flexible as well.

This study attempts to link the outcome; operations flexibility and the organizational resources which consist of capacity, location, technology and integration. Arianda (2003) study engineering consultant service, while this current research expands the scope into 8 categories of service organizations proposed by Schemneer (1986), providing a more broaden ideas of flexibility affecting different industries. In addition we have organizations from two emerging countries; Malaysia and South Africa as the subject of our study.

Literature review

There are four levels of flexibility within organizations (Verdu & Gomez-Gras, 2009), presented as below:

1. Strategic flexibility. This type of flexibility has the potential for a company to transform itself, as well as to deal with hypercompetitive environment and economic crises. Flexibility strategy provides the organization with the new states that engendering learning, as well as addressing adaptation, renewal and enhanced longevity.
2. Structural flexibility. This type of flexibility focuses more on people, and tends to be less formalized and decentralized. This type of flexibility focuses on human resource management in firms, especially some managerial practices which can affect directly on structural flexibility such as compensation system, personal selection, participation, team work, training, job design and authority system. In this case, workers have the main effect on performance especially those who are polyvalent and capable of multitasking. Labor flexible practices like timework have a positive effect in organizational performance.
3. Operational flexibility. This type of flexibility has the capability to meet the unexpected changes depending on ordinary capacities that are based on the organization's structures or current objective. Operations flexibility can affect on the cost and speed of the company's operational

responses. These are generally reversible to short-term changes, which involve day to day or hour to hour operations.

4. Internal and external flexibilities. Internal flexibility is the capability for organizations to adapt to the environment, whereas external flexibility refers to effect of the environment in reducing their vulnerability. Flexible also means changing the organizational environment through actions like communication, innovation and advertisement. Internal and external flexibilities are associated with offensive or defensive behavior in organizations.

Earlier literature discusses flexibility mostly in a manufacturing environment. For example, Chan (2004) proposed that flexibility manufacturing system covers a spectrum of manufacturing activities, which includes machining, welding, fabricating, assembly and a number of other applications. From this definition, it shows that flexibility covers all aspects of manufacturing, from the raw materials of suppliers as well as to the after sales services. However, there are changes in market competition, and thus in customer wants and needs on efficient, good quality, and highly flexible production and service. Flexibility is important to meet the many unexpected changes in consumer requirements. With flexibility capability, organizations will be able to manage rapid changes efficiently and effectively. Flexible strategies in manufacturing firms usually involve reducing the number of workers, improving the utilization of machines, improving the operation control, and reducing both the work in process inventory and the final products inventory.

In a service environment, Correa and Gianesia (1994), for instance, introduced the concept of unplanned changes with a timing dimension. Being flexible is related to the ability to response to the unplanned changes when they take place. In the same study, the authors proposed several dimensions for controlling and filtering; such as monitoring, forecasting, standardizing, maintaining, booking, queuing and promoting, substituting, delegating and subcontracting; focusing on coordination and integration. If the unplanned changes enter through control filter for some reasons, the operation flexibility must deal with it. There are seven types of service operation flexibility:

1. Design flexibility, the ability to introduce new service.
2. Package flexibility, the ability to offer varied services within a period of time.
3. Delivery location services, the ability to offer the service in a variety of places.
4. Delivery time flexibility, the ability to anticipate the services delivery to requirement.
5. Volume flexibility, the ability to change services output levels.
6. System robustness flexibility, the ability to remain operation effectively despite changes affecting inputs and process.

7. Customer recovery flexibility, the ability to recover the customer after some things goes wrong. The effect of unplanned changes goes in tow way, affecting the organization only, and affecting the whole market (Correa & Gianesia, 1994).

In another study concerning a service setting, Harvey, Lefebvre, & Lefebvre (1997) proposed the specificity of services and service delivery process as follows:

1. Services generally involve customer contact of one kind or another;
2. Customers demand increasingly that all the services required to produce a given result be bunched together and delivered in harmony with their activity cycle; and
3. Services are generally consumed as they are produced.

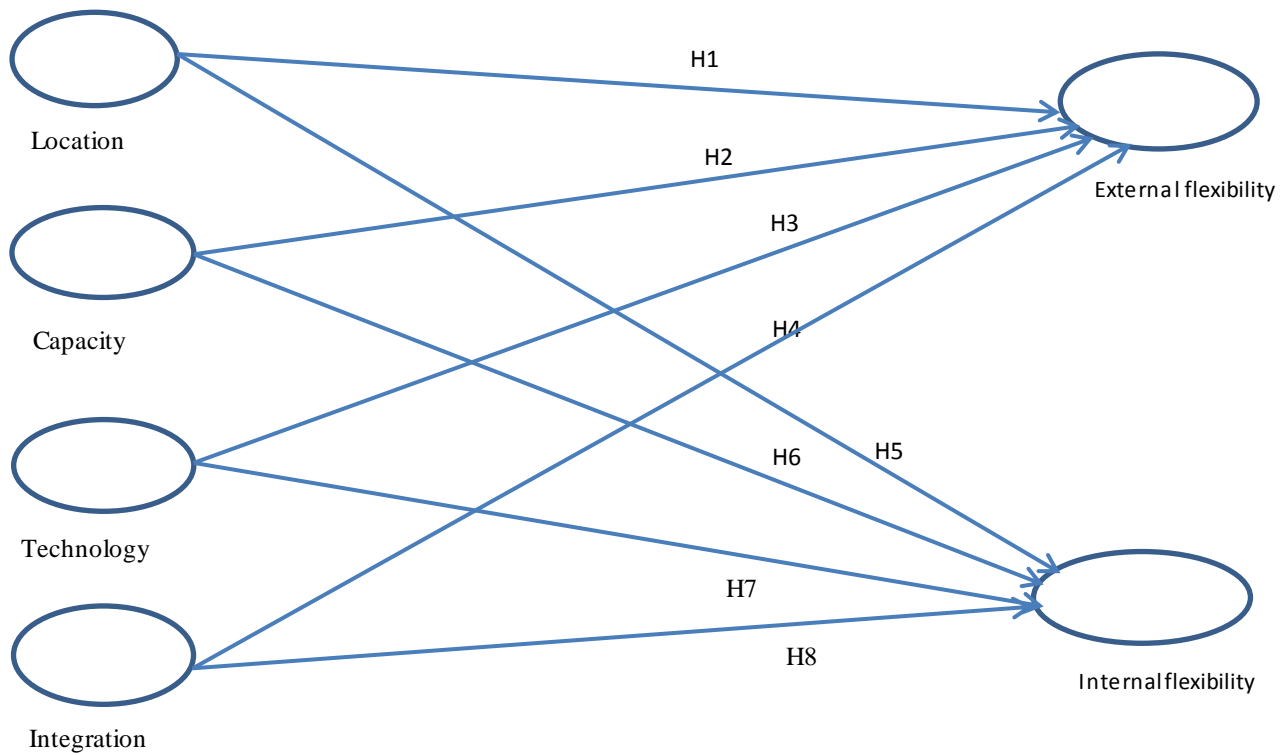
Harvey et al. (1997) also determined the source of variability, both internally and externally. External variability come from market and driven by competition, internal variability comes from aspects of the organization, such as product or process design, organization structure or administrative procedures. On the other hand, Verdu and Gomez-Gras (2009) suggested that organization flexibility is the main capability that enables companies to face with environmental fluctuations, as it makes the organization more responsive to change. In this century, the organization must become more sensitive to changes in the environment in order to have a strategic organizational capability that enables them to change easily and thus to continue to maintain acceptable results without incurring high reorganization costs.

With regards to performance, being flexible is related to the capabilities of these organizations to respond to the unplanned changes when they take place inside or outside organization. External changes come from market and driven by competition and variations in customers' needs, whereas, internal changes comes from aspects of the organization, such as product or process design, organization structure or administrative procedures (Harvey et al. 1997). The notion of flexibility has received researcher attention due to the crucial role that flexibility play inside organization. It motivate employees, enhance their productivity, and help organization to achieve competitive position especially in matters related to adoption and implementation of technologies (Adler, 1988; Idris, Hassan, & Rahman, 2010; Upton, 1994). Moreover, some studies found that organizations that characterized by high level of flexibility outperform other organization with less flexible operation (Merschmann and Thonemann, 2011; More and Subash Babu, 2011). Flexibility of service organization involves the rapid introduction of newly designed service, handling changes in the service mix, handle variation in customer delivery schedules, ability to adjust operation capacity, and customization of service to targeted customer (Aranda, 2003).

The Research Model

The theoretical model established in this study is presented in Figure 1. The main concern of this model is to examine the relationships between location (STL), capacity (STC), technology (STT), and integration (STIN) and internal flexibility (IF) and external flexibility (EF). It is hypothesized that STL, STC, STT, and STIN will have positive and significant effect on both EF and IF in service firms.

Figure 1: The proposed relationships among the latent constructs



Research Methodology

This study used the survey method, and self-administered questionnaires were used to collect data. Service organizations like hotels, hospitals, banks, colleges and universities from two countries i.e., Malaysia and South Africa were considered as the unit of analysis. The services sector has become one of the major drivers of economy development in the two countries, and contributing significantly in in the Gross Domestic Product (GDP). In 2012 it contributes 50% and 65% to the GDP in Malaysia and South Africa respectively (Wikipedia 2012). Managers, middle managers, and top managers were selected as the respondents of this study, due to the fact that they have the power to make decisions regarding the organizational resources, and can provide the required information to achieve the objectives of this study. Since it was not possible to get a list of all elements of the population, non-probability quota sampling which involved dividing the

population of study into mutually exclusive sub-groups was utilized. Then judgmental sampling can be used to choose the participant from each group based on a determined proportion and characteristics (Cavana et al. 2001). In the current study population was divided based on type of services in the two countries (hotels, hospital, bank, fast food restaurant, auto repair, college and university, accountant, and architect organizations. After that, researchers have distributed the questionnaires only to three to five managers in each organization that agreed to take part in this research.

The items that comprised the questionnaire of this study were borrowed from other researchers (Appendix A). For example, internal and external flexibility were measured by using 10 items adapted from Idris et al. (2010), Correa and Gianessi (1994), and Harvey et al. (1997). Structural elements in term of location, capacity, technology, and integration were measured by using 15 items adapted from Boyer and McDermott (1999). The questionnaire has used seven point likert scale ranging from 1= strongly disagree to 7= strongly agree for internal and external flexibility, whereas, for structural element, the likert scale range from 1=low to 7=high.

The recommended number of respondents is to have ten times observation as the number of variable to be analyzed (Hair et al. 2006). This study has applied this rule, and found the minimum number of participants is to have 250 (25X10). Some researchers from one of the prominent universities in Cape Town helped in making data collection process possible. Therefore, data was collected at the same time in Malaysia and South Africa and applied similar procedure. At the first stage, researchers have mailed an official letter to organizations to inform them that they have been selected as respondents, explain to them the objectives of this study, and request their help to make this process feasible. Next, researchers have visited the service organizations that showed interest to participate in this study to provide them with more information about the importance and benefits of conducting this study, and to convince them to participate in this survey. Subsequently 300 questionnaires were distributed to 60 organizations in Malaysia and same number was distributed to 55 organizations in South Africa. The questionnaires were distributed personally by researchers to three to five managers in the 110 organizations that agreed to participate. Of the 600 questionnaires that were distributed, 255 from Malaysia and 235 from South Africa were returned, and 452 from the two countries were usable for further analysis (see table 1).

Table 1: Response rate in Malaysia and South Africa

		Number/frequency
Malaysia	Number of Questionnaires distributed	300
	Number of questionnaire returned	255
	Response rate	85%
	Number of usable questionnaire	228
	Effective Response rate	76%
South Africa	Number of Questionnaires distributed	300
	Number of questionnaire returned	235
	Response rate	78%
	Number of usable questionnaire	224
	Effective Response rate	74%

Data Analysis

This study has used t-test to examine if there is a significant difference between the variables of study across Malaysia and South Africa. The result illustrated in Table 2 demonstrated no significant differences in the score of Malaysia and South Africa on all variables except for STC. However, the magnitude of this difference in the means was small ($\eta^2 = \frac{t^2}{t^2 + N - 1} = 0.018$) (Pallant 2007). Therefore, the 452 usable questionnaires that were collected from Malaysia and South Africa were merged to examine the conceptual model developed in this study.

Table 2: Difference between major variables by country

Variables	Malaysia (mean)	South Africa (mean)	t-values	Effect size measured by eta squared (Pallant, 2001)
EF	5.33	5.36	-0.320	0.018
IF	5.17	5.08	1.053	
STL	5.55	5.59	-.369	
STC	5.40	5.10	2.91	
STT	5.25	5.27	-0.148	
STIN	5.22	5.18	0.499	

*p<0.05, **p<0.01

Table 3: Profile of Respondents

		Frequency (N)	Percentage (%)
Profession	Manager	193	42.6%
	Middle manger	51	11.3%
	Top manger	68	15%
	others	140	31%
Tenure	5 years and less	290	64.2%
	6 -10	86	19%
	11-15	44	9.7%

	16 years and above	32	7.1%
Type of service	hotel	55	12.2%
	Fast food restaurant	51	11.3%
	hospital	40	8.8%
	Auto repair	48	10.6%
	Retail store	47	10.4%
	Bank	54	11.9%
	Private college	55	12.2%
	Architect	53	11.7%
	Accountant	49	10.8%
Years operation of firm	5 years and less	72	15.9%
	6 -10	128	28.3%
	11-15	94	20.7%
	16 years and above	158	35%
Firm's market	Local	279	61.7%
	Regional	53	11.7%
	Global	120	26.5%

The majority of participants (69%) were manager, middle manager, and/ or top manager. Approximately 83% of participants have a 10-years working experience within same organization. Almost 65% of service organizations have less than 15 years of experience in the market. The majority of sample (61%) was from local firms. Lastly, the service organizations that have participated in this study contributed equally in term of number of respondents.

Table 4 shows the descriptive analysis of the constructs of this study in term of means, standard deviations, inter-correlations, and Cronbach's alpha. The correlation results portray a positive and significant relationship between the constructs. Additionally, Cronbach's alpha for all constructs exceeds the suggested value of 0.70 (Nunnally 1978), which indicates that all items loaded highly on its related construct. This provided evidence for internal consistency reliability at the individual items.

Table 4: Descriptive statistics, correlation among study variables, and values of alpha

	Mean	SD	Alpha	1	2	3	4	5	6
EF	5.34	1.06	0.90	1					
IF	5.13	0.92	0.724	0.67**	1				
STL	5.57	1.04	0.837	0.331**	0.364**	1			
STC	5.24	1.13	0.778	0.376**	0.344**	0.316**	1		
STT	5.26	1.26	0.88	0.489**	0.469**	0.323**	0.486**	1	
STIN	5.20	1.02	0.768	0.394**	0.349**	0.317**	0.413**	0.97**	1

**Correlation is significant at the 0.01 level (2-tailed).

4.1 Model evaluation

To analyze the data, partial least square (PLS) was used. Using this sophisticated statistical technique can be ascribed for different reasons. For instance, PLS can handle both reflective and formative factors (Chin 1998; Gefen et al. 2000), PLS is less demanding in term of sample size

and distribution of data (Hair et al. 2011), and PLS main concern is to predict the relationships and maximize the explained variance which is consistent with the objectives of this study. Smart PLS version 2.0 with the applications of algorithm and bootstrapping techniques was applied. A total of 5000 resamples were used to generate the standard error and t values to determine the significance levels of factor loading and path coefficients (Hair et al. 2013). Two stages procedures recommended by Anderson and Gerbing (1988) was utilized to evaluate the model. In the first stage, the convergent and discriminant validity of measurement model were assessed, followed by testing the sign, magnitude, and direction of the hypothetical relationships described in the structural model.

Before evaluating the model this study has examined the presence of common method variance (CMV), which refers to the variance explained due to measurement methods rather than the construct of interest (Podsakoff et al. 2003). CMV can be a problem when variables are latent and measured using cross sectional method (Aker et al. 2010; Podsakoff et al. 2003). To address this problem, this study has applied Harman 1-factor test on the latent variables of this study. The test indicated that none of the six constructs explain more than 50% of the total variance. Therefore, CMV was not considered a major concern in this study.

4.1.1 Measurement model results

To examine the quality of measurement model in term of it is convergent validity and discriminate validity, confirmatory factor analysis (CFA) was conducted. As shown in Table 5 all factor loading exceeded the threshold value of 0.60 (Chin et al. 1997) and significant at 0.01. Moreover, all Average Variance Extracted (AVEs), and composite reliability (CRs) surpassed the cut-off values of 0.50 and 0.70 respectively (Chin 2010; Gefen et al. 2000; Henseler et al. 2009; Ringle et al. 2010). Subsequently, converged validity which demonstrates that all items loaded strongly on its respective construct rather than other constructs was assured. Additionally, Table 6 shows the square root of the AVEs (Diagonal values) of all constructs are greater than their corresponding correlation coefficients (off-diagonal values). Furthermore, Table 7 illustrates the loading of each indicator on its respective latent construct is higher than all of its cross-loadings in row and column. Consequently, this satisfies the criteria of discriminant validity, which indicate that the construct share more variance with it is own measures rather than other constructs (Chin 1998; Fornell & Lircker 1981). Accordingly, the measurement model was considered satisfactory and it was possible to move forward to evaluate the structural model.

Table 5: Psychometric properties of constructs

Construct	Items	Loading	t-values	AVE	CR
EF	EF1	0.853	51.587	0.711	0.925
	EF2	0.866	57.145		
	EF3	0.842	38.896		
	EF4	0.847	44.603		
	EF5	0.808	39.602		
IF	IF1	0.769	25.754	0.570	0.839
	IF2	0.830	47.682		
	IF3	0.798	34.217		
	IF5	0.601	10.756		
STC	StC1	0.906	66.226	0.821	0.901
	StC2	0.906	52.009		
STIN	StIN1	0.743	20.198	0.527	0.847

	StIN2	0.797	31.267		
	StIN3	0.626	13.437		
	StIN4	0.704	20.654		
	StIN5	0.749	20.813		
STL	StL1	0.937	105.509	0.859	0.924
	StL2	0.917	66.867		
STT	StT1	0.710	23.043	0.631	0.911
	StT2	0.821	32.108		
	StT3	0.820	37.199		
	StT4	0.835	44.758		
	StT5	0.803	36.063		
	StT6	0.770	26.983		

Note1: AVE refers to average variance extracted, CR refers to composite reliability

Note2: IF4 was deleted to increase the value of AVE

Table 6: Discriminate validity at construct level

	EF	IF	STC	STIN	STL	STT
EF	0.843					
IF	0.724	0.755				
STC	0.377	0.377	0.906			
STIN	0.402	0.402	0.401	0.726		
STL	0.332	0.385	0.321	0.322	0.927	
STT	0.491	0.509	0.485	0.494	0.324	0.794

Note: Diagonals represent the square root of AVE while off-diagonals represent the correlations

Table 7: Table 7: Discriminant validity at item level

	EF	IF	STC	STIN	STL	STT
EF1	0.853	0.583	0.301	0.332	0.257	0.420
EF2	0.866	0.588	0.357	0.327	0.256	0.437
EF3	0.842	0.582	0.305	0.315	0.306	0.408
EF4	0.847	0.639	0.309	0.382	0.284	0.418
EF5	0.808	0.662	0.316	0.337	0.300	0.387
IF1	0.591	0.769	0.291	0.316	0.289	0.381
IF2	0.611	0.830	0.307	0.364	0.306	0.452
IF3	0.572	0.798	0.278	0.328	0.330	0.415
IF5	0.381	0.601	0.269	0.174	0.230	0.262
StC1	0.349	0.333	0.906	0.361	0.351	0.418
StC2	0.334	0.350	0.906	0.364	0.230	0.462
StI1	0.237	0.265	0.350	0.743	0.218	0.377
StI2	0.277	0.310	0.308	0.797	0.256	0.340
StI3	0.279	0.252	0.326	0.626	0.204	0.364
StI4	0.330	0.308	0.191	0.704	0.243	0.322
StI5	0.320	0.313	0.298	0.749	0.240	0.391
StL1	0.326	0.380	0.309	0.317	0.937	0.321
StL2	0.288	0.331	0.284	0.278	0.917	0.278
StT1	0.364	0.363	0.373	0.362	0.267	0.710
StT2	0.346	0.361	0.415	0.420	0.293	0.821
StT3	0.364	0.400	0.392	0.432	0.218	0.820
StT4	0.442	0.453	0.346	0.408	0.277	0.835
StT5	0.396	0.399	0.356	0.390	0.266	0.803
StT6	0.414	0.434	0.435	0.344	0.227	0.770

4.1.2 Structural model results

PLS algorithm and bootstrapping procedure with 5000 resample was applied to generate the path coefficients and their corresponding t values to determine whether these paths are significant or not (Hair et al. 2013; Ringle et al. 2010). As all hypothetical relationships developed in this study are positive, one-tailed test for t Student distribution was applied. According to Hair et al. (2011), critical t-values for one-tailed test are 1.28 ($p < 0.10$), 1.645 ($p < 0.05$), and 2.33 ($p < 0.01$). Results illustrated in Figure 2 and Table 8 and indicate that STL ($\beta = 0.144$, $p < 0.01$), STC ($\beta = 0.118$, $p < 0.05$), STT ($\beta = 0.311$, $p < 0.01$), and STIN ($\beta = 0.158$, $p < 0.01$) have positive and significant effect on EF, explaining 30.7 percent of the variance present in external flexibility. Additionally, STL ($\beta = 0.204$, $p < 0.01$), STC ($\beta = 0.098$, $p < 0.05$), STT ($\beta = 0.329$, $p < 0.01$), and STIN ($\beta = 0.135$, $p < 0.05$) also found to exert positive effect on IF, with an explained variance of 33.7 percent. In nutshell, the results provide sufficient support for all hypotheses tested in this study.

Figure 2: The structural mode results.

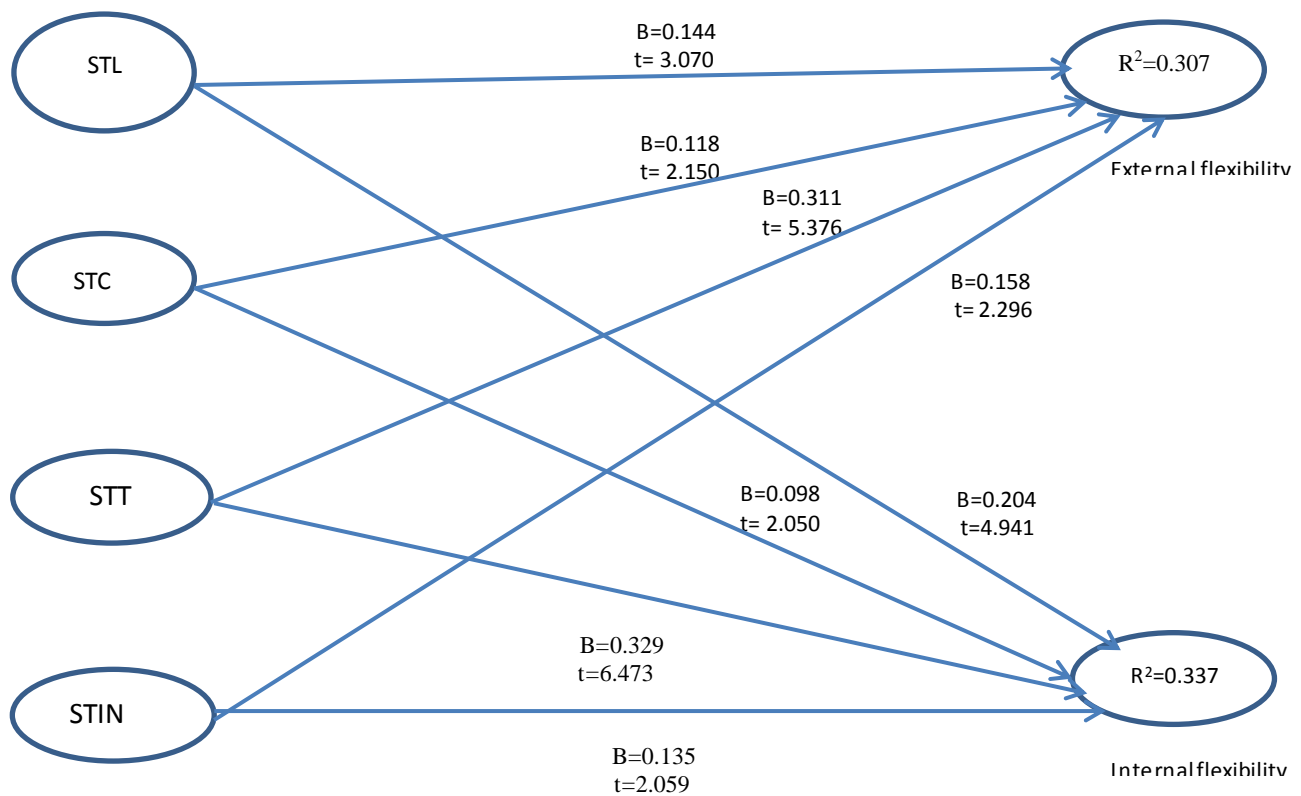


Table 8: Summary of structural model

Hypotheses	Path coefficient	Stander error	t- values	Decision
H1:STL→EF	0.144	0.047	3.070	Supported
H2: STC→EF	0.118	0.055	2.150	Supported
H3: STT→EF	0.311	0.058	5.376	Supported
H4:STIN→ EF	0.158	0.067	2.296	Supported
H5: STL→ IF	0.204	0.041	4.941	Supported
H6: STC→ IF	0.098	0.048	2.050	Supported
H7: STT→IF	0.329	0.051	6.473	Supported
H8: STIN→ IF	0.135	0.066	2.059	Supported

Blindfolding procedures was also implemented to measure the model's predictive relevance (Q^2) (Tenenhaus et al. 2005). When the values of Q^2 are greater than zero, it indicates the model has predictive relevance (Fornell & Cha 1994). In the current study, Q^2 values of EF and IF were 0.215, and 0.191 respectively. Therefore, it can be concluded that the structural model has predictive relevance (Fornell & Cha 1994). Furthermore, this study has estimated the global fit index (GOF) to assess the global validity of the model. GOF refers to the geometric mean of the average communality and the average R^2 of endogenous latent variables (Tenenhaus et al., 2005). According to Wetzels et al. (2009), GOF values of 0.1, 0.25, and 0.36 are small, medium, and great respectively. In this study the GOF value was 0.47 which exceeded the cut-off value of 0.36 for large effect size. This indicate that GOF value was large enough to support the validation of PLS model globally (Wetzels et al. 2009).

Discussion

The findings indicate that all four factors have significant influence on both types of operations flexibility. The strongest factor to affect internal flexibility is technology ($B=0.329$; $t=6.473$). It is true for factor that affect external flexibility ($B=0.311$; $t= 5.376$). The results are consistent with previous findings. For example, Harvey et al (1997) proposed the use of structural element, mainly IT in order to manage flexibility. This is supported by Bucki and Pesqueux (2000) who suggested components of operations strategy on structural and infrastructural elements, also as a function of operations flexibility. Adler (1985) agreed that flexibility in organizations is a useful tool to improve firms' competitive position as related to the use of technologies in implementation and the decision- making process. Upton (1984) supported the idea and added that firms should create an infrastructure to allow for system flexibility. As a result of technological improvement and changes in customer preferences, service operations have become flexible and this requires adjustment in the delivery process. Upton (1984) also pointed out that customers expect and prefer to get services at their convenient time and location, therefore flexibility on the part of the service provider is imperative.

One specific example on how structural elements such as technology and integration play an influencing role in service operation flexibility is the use of ATM machines. Banks that have ATM services have been providing convenient services to customers for years. In accordance with this, ATM services have improved over time. Two of the improvements mentioned include the increase

in the limit of the amount in withdrawal transactions and the expansion of ATM units strategically situated in many convenient locations. As a result, ATM services nowadays are not solely restricted to bank premises but can also be found at airports, petrol stations, bus stations, fast food restaurants and many other places. The changes in the way banks deliver services indicate the degree of flexibility in service operations that benefits banks and customers alike. ATM technology may require some investment on the banks' side, but in the long run, it reduces operating costs by decreasing the number of staff at counter services. Davis and Heineke (2005) concluded that reduction in customers' waiting time at counter services by improving better services management of process design can certainly reduce customers' dissatisfaction and defection and technology could help to achieve this goal.

Technologies have proven to be able to offer more opportunities in improving services processes (Collier 1994). This is evident in the use and application of electronic devices for check-in and check-out systems in the hotel industry, automatic toll booth in transportation, electronic fund transfer in banking services, the practices of "e-ticketing" in the airline business, and airport checking process. Therefore, in responding effectively to customers' demand variations, improving services process design by using technology is another approach to increase flexibility of the service system.

Conclusion

This is an empirical research, involving four important organizational resources and their effects on operation flexibility. Particularly, it is within the context of service industry in Malaysia and South African service industries. The study employed a potent SEM PLS methods to test the relationship and predict which factor has the most influence. It is found that technology has the strongest influence to both types of operations flexibility. This is consistent with previous many findings.

References

- Akter, S., D'Ambra, J., and Ray, P. 2010. Development and validation of instrument to measure user perceived quality of mHealth. *Information and Management*, 50: 181- 195.
- Anderson, J. C. and Gerbing, D. W. (1988). Structural equation modeling in practice: a review and recommended two-step approach. *Psycho Bull*, 103(3):411-423.
- Boyer, K.K. & McDermott, C. (1999). Strategic consensus in operation strategy. *Journal of Operation Management*, 17: 289-305.
- Cavana, R. Y., Delahaye, B. L. and Sekaran, U. 2001. Applied business research: Qualitative and quantitative methods. Australia: John Wiley & Sons, Ltd.

- Chin, W. W., Abhijit, G. and William, D. S. (1997). Advancing the theory of adaptive structuration: the development of a scale to measure faithfulness of appropriation. *Information System Research*, 8(4): 342- 367.
- Chin, W.W. (1998). Issues and opinions on structural equation modeling. *MIS Quarterly* 22 (1): 7-26.
- Chin, W. W. (2010). How to write up and report PLS analyses. In: EspositoVinzi V, Chin W. W., Henseler J. Wang H (eds.) *Handbook of partial least squares: concepts, methods and applications*. Springer, Heidelberg pp 655-690.
- Correa H. L. and Gianesi I. G. N. (1994). Service operation flexibility. International conference of the European operation management association.
- Fornell, C. and Cha, J. (1994). *Partial least squares*. In *Advanced Methods of Marketing Research*, ed. R.P. Bagozzi, Blackwell, Cambridge, MA. pp. 52-78.
- Fornell, C. and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 48: 39–50.
- Gefen, D., Straub, D. and Boudreau, M. (2000). Structural equation modeling techniques and regression: Guidelines for research practice. *Communications of the Association for Information Systems* 7 (7): 1-78.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C., (1998). *Multivariate Data Analysis* (5th edition), New Jersey, Prentice Hall.
- Hair, J.F., Black, W.C., Babin, B. J., Anderson, R.E. and Tatham. R.L (2010). *Multivariate data analysis*, 7th edn. Prentice Hall, Upper Saddle River , NJ.
- Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E. & Tatham, R. L. (2006). *Multivariate data analysis (6th Eds.)*. Upper Saddle River, New Jersey, USA: Prentice- Hall, International Inc.
- Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage: Thousand Oaks, California
- Hair, J. F., Ringle, M. C. & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice* 9(2): 139-151.
- Harvey J., Lefebvre L. A. and Lefebvre E. (1997). Flexibility and technology in services: a conceptual model. *International journal of operation and production management*, 17(1): 29-45.
- Henseler, J., Christain, M., Ringle, R. & Sinkovics. (2009). The use of partial least square path modeling in international marketing. *Advances in International Marketing* 20: 277-319.
- Idris, F., Hassan, M.E.M. and Rahman, N.M.N.A. (2010). The impacts of structural and infrastructural elements to service operations flexibility: the influence of technology,

International Conference on Education and Management Technology Proceedings, Egypt, Cairo, 2-4 November.

Nunnally, J. C. (1978). *Psychometric Theory*, 2nd ed. McGraw-Hill, New York.

Pallant, J. 2007. *SPSS survival manual: Step-by-step guide to data analysis*, 3rd edn, Allen & Unwin, Australia.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88: 879-903.

Ringle, C. M., Wende, S. and Will, A. (2010). Finite mixture partial least squares analysis: Methodology and numerical examples. In V. E. Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares: Concepts, methods and applications in marketing and related fields* (pp. 195–218). Berlin: Springer.

Tenenhaus, M., Esposito Vinzi, V.E., Chatelin, Y.M. & Lauro, C. (2005). PLS path Modeling. *Computational Statistics and Data Analysis* 48(1): 159-205.

Wetzels, M., Odekerken-Schroder, G., van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, 33 (1), pp. 177-195.

Wikipedia 2012. List of countries by GDP(PPP).

[http://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(PPP\)](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP)) (Accessed may 13, 2014).

Appendix A



National University of Malaysia

School of Business Management, Faculty of Economics and Business

A Survey of Service Operations in New Emerging Economies

Dear Valued Respondents,

It is our pleasure to invite you to participate in this survey.

Currently, because of intensive competition in service industry, it is imperative for service firms to improve their ability to make a quick response to the dynamic customers' needs, and one of the key success is firm's ability to be flexible. Understanding these issues will hold the key to ascertain the extent to which the firms could satisfy their customers. It is hoped that the result of this survey will help managers to understand the role of flexibility in their operations.

The entire questionnaire should take about 20 minutes to complete. All the information provided in this questionnaire will be kept strictly confidential and that its use will be confined to only establishing the statistical data required for the study. Thank you for participating in this survey. If you have any further questions, please do not hesitate to contact us.

Sincerely,

Dr. Fazli Idris

Lead Researcher

School of Business Management,

UKM

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3. STRUCTURAL ELEMENTS								
Answer with score in range 1 to 7 (1 = Very Far / Very Difficult, to 4 = Moderate Distance / Easy, to 7 = Very Close / Very Easy).								
Location		Very Far			Very Close			
No		1 ←————→ 7 (Please circle only one number on the scale).						
1	Please indicate the proximity of your firm location to your target customer	1	2	3	4	5	6	7
No		Very Difficult			Very Easy			
1	Please indicate the accessibility of your firm location to your target customer	1	2	3	4	5	6	7

Answer with score in range 1 to 7 (1 = Low Investment, to 4 = Moderate Investment, to 7 = High Investment).								
Capacity		Low Investment			High Investment			
No	Please indicate the level of investment of your firm in the following activities.	1 ←————→ 7 (Please circle only one number on the scale)						
1	Upgrading / improvement of existing facilities	1	2	3	4	5	6	7
2	Expansion of facilities (e.g. adding more check-in counters or queue lines, moving to new facilities, etc.)	1	2	3	4	5	6	7

Answer with score in range 1 to 7 (1 = Very Low, to 4 = Moderate, to 7 = Very High).								
Integration / Networking		Very Low			Very High			
No	Please indicate the degree of relationship which your firm places with respects to the following...	1 ←————→ 7 (Please circle only one number on the scale)						
1	Forging a partnership with related agencies	1	2	3	4	5	6	7
2	Forging alliances with suppliers	1	2	3	4	5	6	7
3	Forging a partnership with competitors	1	2	3	4	5	6	7
4	Forging relationship with customers	1	2	3	4	5	6	7
5	Forging close relationship with local communities	1	2	3	4	5	6	7

Answer with score in range 1 to 7 (1 = Low Investment, to 4 = Moderate Investment, to 7 = High Investment).							
Technology		Low Investment			High Investment		

No	Please indicate the level of investment of your firm in the following activities.	1 ←————→ 7 (Please circle only one number on the scale)						
1	ICT system for firm operations (e-mail system, Intranet system, fax, telephone, etc.)	1	2	3	4	5	6	7
2	Computerized customer information (e.g. customer's database)	1	2	3	4	5	6	7
3	An integrated information system for tracking customer record	1	2	3	4	5	6	7
4	Firm's homepage with sufficient information	1	2	3	4	5	6	7
5	On line system (e.g. booking, registration, appointment)	1	2	3	4	5	6	7
6	Latest technology relevant for enhancement of the business operations (e.g. latest scanning system for hospital or new ATMs for banks)	1	2	3	4	5	6	7

Answer with score in range 1 to 7 (1 = Strongly Disagree, to 4 = Neither Agree nor Disagree, to 7 = Strongly Agree).								
External Flexibility		Strongly Disagree			Strongly Agree			
No	Please indicate your level of agreement or disagreement with the following statements, start with "Within the last three years....."	1 ←————→ 7 (Please circle only one number on the scale)						
1	we have been able to offer new, unique, and innovative services to our customer	1	2	3	4	5	6	7
2	we have been able to integrate some features of services into an alternative packages that are requested by customer	1	2	3	4	5	6	7
3	we have been able to offer a large number of service features and variety	1	2	3	4	5	6	7
4	we have been able to anticipate the service delivery to customer's requirements	1	2	3	4	5	6	7
5	we have been able to recover the service to customer after something goes wrong	1	2	3	4	5	6	7

Answer with score in range 1 to 7 (1 = Strongly Disagree, to 4 = Neither Agree nor Disagree, to 7 = Strongly Agree).								
Internal Robustness		Strongly Disagree			Strongly Agree			
No	Please indicate your level of agreement or disagreement with the following statements, start with "Within the last three years....."	1 ←————→ 7 (Please circle only one number on the scale)						
1	our ability to remain operating effectively despite some elements of service goes wrong has been enhanced	1	2	3	4	5	6	7
2	there seems to be less confusions in procedures to the employees to carry their responsibility	1	2	3	4	5	6	7
3	managers seem to contradict themselves while making important decisions	1	2	3	4	5	6	7
4	there has been fewer stoppage of activities due to maintenance glitches	1	2	3	4	5	6	7
5	employees know what to do when there is a system failure such as 'blackout' or accident	1	2	3	4	5	6	7

FIRM PROFILES	
Type of service	: <ul style="list-style-type: none"> ▪ Hotel ▪ Fast food restaurant ▪ Hospital ▪ Auto repair ▪ Retail Store ▪ Bank (Retail business of banking) ▪ Architect ▪ Accountant ▪ Private College/University
City & Country of firm location	:
Your position in the firm	:
How long have you been with this firm	:
Operational years of firm	:
Firm's market	: <ul style="list-style-type: none"> ▪ Local / National ▪ Regional ▪ Global / International
<p>Please state your name and e-mail address if you would like to receive a copy of the research finding (OPTIONAL)</p>	