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Advanced Operations Technology on Cost Performances in Services: Stakeholder Integration As Mediator

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Abstract
The objective of the study is to determine the impact of advanced operation technology and stakeholder integration on firms' costs performances. A model is proposed that links advanced operations technology (AOT), to firms' cost performances (CP) via stakeholder integration (SI). The underlying dimensions of advanced operations technology, stakeholder integration, and costs performances were empirically verified and validated through confirmatory factor analysis (CFA), reliability analysis procedure, and construct validity test. Structural Equation Modeling (SEM) was employed to test the model, drawing on a sample of 254 operations managers or equivalent positions who work in service sectors in Malaysia. Data analysis revealed that, a significant relationship was found between the level of stakeholder integration and costs performances. Further, advanced operations technology significantly influences costs performances and it was realized through the mediating role of stakeholder integration. Overall, as this study confirms the impact of advanced operations technology on stakeholder integration and costs performances in services sector in Malaysia, Managers should pay attention to enhancing technology and stakeholder integration in their organizations.
Keywords: Advanced Operations Technology, Stakeholder Integration, Costs Performances, Services, Malaysia.

Introduction

Advanced operations technology (AOT), has been known to affect operational performance (OP). Ahi et al (2021) conducted a systematic literature review on advanced technologies and international business. In a Delphi study done by a panel expert attached with Journal of Service Management identified that technology influences many aspects of service operations (Field et al., 2018). Changes in information technology, which is one important part of operations technology, have resulted in a significant change in service delivery processes that help service personnel to perform better job while interacting with customers. ATMs services also have improved over time, for example, the increase of withdrawal limit. For flexibility purpose, ATM machines are placed at many locations to enhance services.

Today, ATM services do not concentrate at banks' premises but also position at many strategic locations for better access for the customers and users.

Technology does not work in isolation and must be coupled with other enablers of business operations in order to give the greatest impact to the company performances. Gupta and Somers (1996) find that firms should not focus on technology implementation alone because it does not lead to competitive advantage. The ability of a firm to forge alliances with relevant parties that support its business strategy must be offered to complement the equation. Different terms are being used to depict this 'forging' factor to match different contexts. Familiar terms are supply chain integration (Salam, 2017; Feng et al., 2017), subsidiaries' internal and external integration (Demetera et al., 2016) and forging strong partnerships (Roloff et al., 2015). Beside major findings of the important of technology and trust, Salam (2017) pointed out that supply chain collaboration also play a mediating role. The findings are consistent with previous study such as Fawcett et al (2012) who argued that supply chain collaboration is a critical dynamic capability that can bring about distinction in performance. Supply chain collaboration is one of the important developments for supply chains (Autry, 2013). Within the supply lines, collaboration among firms are creating inclusive scope, fortifying a company's long term place in the supply chain, that would make companies ready to develop an appealing performance (Fawcett et al., 2012). This paper proposes stakeholder integrations as one of the critical factors. With the advanced technology, stakeholder must be integrated into the process. Similar to supply chain collaboration, stakeholder integration (SI) refers to the level of stakeholder involvement in organizations' supply chain or business process.

Most research have been conducted in manufacturing but limited in services. Therefore, it is compelling that researchers further scrutinize these important factors for service-based organizations. This paper explains the relationship of advanced operations technology, stakeholder integration, and operational performances together. Concisely, the objective for this study is to examine the influence of advanced operations technology and the possible mediating influence of stakeholder integration on cost performances of service companies in Malaysia.

The following section discusses each important construct, conceptual framework, methodology and research finding.

Literature Review

This section covers literature for advanced operation technology, stakeholder integration and Operational cost

Advanced Operations Technology

In a study, Kano et al (2020) observed how advanced technology, specifically digital oriented affect complex structures of suppliers which form the global value chain. In addition, Vanpoucke et al (2017) examined the impact of supply chain integration through information technology and found that operational integration is essential to catch the best of information exchange. An interesting results show that the upstream integration get the stronger impact of the use of information technology (IT).

Salam (2017) highlighted technology and trust with supply chain collaboration as a mediator, among factors that affect operational performance. The study's findings suggest that as trust evolves and is shaped over time in a strong relationship, this process can form a competitive capability that may not be easy for competitors to replicate. Both trust and technology are found to have significant impact on supply chain collaboration and on firms' operational performances.

For the current study, we consider advanced operations technology as any sorts of devices or system that enhances the operations of service companies.

Technologies in the rapid technological change have become important to service organization for service firms to be competitive in the industry.

Stakeholder Integration

Stakeholder integration evolves from many angles. Danso et al (2020) look at relationship among stakeholder integration with environmental sustainability orientation and financial performance and support a mediating model. In one study, Roloff et al (2015) found important factors such as open communication, willingness to engage in mutual learning and encouraging innovations are experimental in fruitful partnerships. These factors must be interwoven to bear a positive partnership which will lead to positive outcomes.

Using a case study of a German provider of health instrument, Jonas and Roth (2017) analyzed the practice of stakeholder integration in a service innovation project. Integration of internal and external stakeholders in service innovation, stakeholder integration in service systems creates interdependencies between stakeholders. The implication show that indirect ways of stakeholder integration have to be taken into account for project and stakeholder management. In the study, it is shown that the highest performance benefits can only be achieved if both suppliers and customers are involved in this process.

In another study, a model explaining the link between internal integration, external integration and operational performance is proposed (Demetera et al., 2016). Based on the results, it is set forth that knowledge generated within the internal manufacturing network can only be converted into subsidiary-level operational performance, if it is shared and recombined with external supply chain partners.

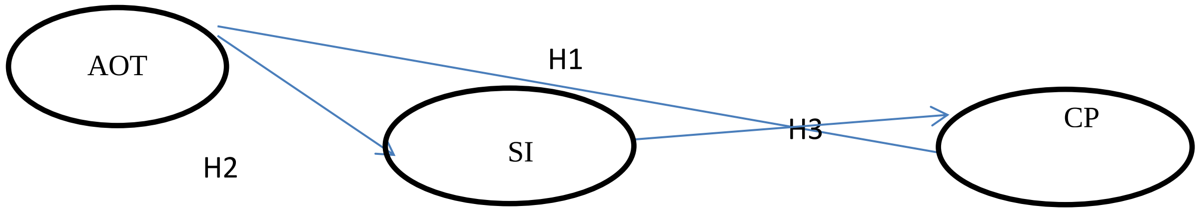
In this study, we operationally defined stakeholder integration as the level of stakeholder involvement in the business process.

Operations Costs

Costs reduction is one of the most important operations objectives. Measures of cost effectiveness are well documented and should be included. Several studies in the related field offer some insights into this. For example, Hendricks and Singhall (1997) deliberated costs as part of performance measures, besides other measures such as productivity and innovation. Another study also used cost indicators to measure performance in their study (Terziovski and Samson, 1999)

All of above discussions lead to a conceptual framework and our hypotheses as shown in Figure 1

FIGURE 1
The Proposed Relationships Among Variables



H1: Advanced operations technology has a positive effect on costs performances
H2: Advanced operations technology has a positive effect on stakeholder integration.
H3: Stakeholder Integration has a positive effect on costs performances

In addition, it is also implicated that integration has a positive effect on operations performances As stakeholder integration could be proposed to be the mediating construct, we hypothesize that;

H4:

Research Methodology
Survey Instrument
The survey instrument is composed of questions relating to three constructs, namely: advanced operations technology, stakeholder integration and costs performances. The advanced operations technology measures was adapted from Salam (2017) and Noh and Fitzsimmons (1999) while costs performances measures construct was adapted from (Anderson & Soha, 1999; Hendricks & Singhall, 1997; Terziosvski & Samson, 1999). The conceptual definition of the stakeholder integration construct was adapted from the works of Jonas and Roth (2017). Moreover, these constructs are deemed to be the most comprehensive practices for measuring the impact of advanced operations technology on stakeholder integration and costs performances, thus making them suitable for the research objectives of this study. Minor modifications were made to some items in the original scale to adjust for semantic meanings. Scales were based on the seven-point Likert scale, ranging from "least important" to "very important".

Sampling
An ideal sample size depends entirely upon the type of research being conducted. Generally, however, the rule of thumb for determining statistical power (viz., sample size) is 'five observations for each independent variable' (Hair et al., 2010). For this study, the researcher selected a moderate yet appropriate sample size of two hundred and fifty (254) respondents from the Hotels, Fast food, Hospitals, Auto repair, Retail store, Retail Bank, Private college, Architect, and Accountant.

A purposive sampling method was used for the selection of respondents from the list of the targeted population of the study. The purposive sampling technique is a non-probability sampling method, which allows the researcher to select participants who are willing and available to be studied (Creswell, 2008). Although this method cannot guarantee that the participants or individuals selected for the study offer an accurate representation of the population, the strength of this technique, however, lies in the fact that it allows the researcher to choose a rich sample who are more willing to provide useful information needed to answer the research questions and hypotheses (Creswell, 2008).

Descriptive Statistics Results

Demographic background of the respondents is shown in the following Table 1.

Table 1

Characteristics of respondents in terms of their Demographic Variables

		Frequency (N)	Percent (%)
Firm's market			
	Local / national	170	66.9
	Global / regional	84	33.1
Profession			
	Manager	106	41.7
	Middle Manager	44	17.3
	Top Manager	19	7.5
	Others	85	33.5
Years operation of firm			
	1-3 years	32	12.6
	3-6 years	95	37.4
	6-10 years	49	19.3
	More than 10 years	78	30.7
Type of Service			
	Hotel	31	12.2
	Fast food	30	11.8
	Hospital	24	9.4
	Auto repair	26	10.2
	Retail store	30	11.8
	Retail Bank	30	11.8
	Private college	30	11.8
	Architect	30	11.8
	Accountant	23	9.1

Note: Total number of Respondents = 254

Out of the 254 respondents participated in the study, 170 (66.9%) were national firm. The majority of the respondents (106 or 41.7 %) were managers.

Regarding the years operation of firm, 32 (12.6%) were between (1-3 years), 95 (37.4%) were between (3-6 years), 49 (19.3%) were between (6-10), 78 (30.7%) were more than 10 years.

The majority services of the respondents' organization are hotels, fast food, hospitals, auto repair, retail store, bank, private college, architect, and accountant.

Assessing Validity and Reliability

Reliability in construct measurement, according to Hair et al. (2006), is the degree of consistency among different measurements. Table 2 shows the measures, the descriptive statistics and the Cronbach's alpha score of the constructs. All factors show satisfactory level. The values of 0.70 recommended by (Hair et al., 2006) and 0.60 as recommended by Nunnally (1978). Thus, this questionnaire is well established and accepted, or reliable. For construct validity, this study utilizes confirmatory factor analysis using the analysis of moment structures software (AMOS) with maximum likelihood (ML).

Table 2
Measurement of the variables of the hypothesized model

Construct	Item	Measure	Mean	SD	Alpha
Stakeholder integration	StI1	Forging a partnership with related agencies	5.13	1.141	.783
	StI2	Forging alliances with suppliers	5.21	1.006	
	StI3	Forging a partnership with competitors	5.07	1.129	
	StI4	Forging relationship with customers	5.69	1.057	
	StI5	Forging close relationship with local communities	5.50	1.024	
Advanced operations technology	StT1	ICT systems for firm operations (e-mail system, Intranet system, fax, telephone, etc.)	5.46	1.163	.868
	StT2	Computerized customer information (e.g. customer's database)	5.47	1.100	
	StT3	An integrated information system for tracking customer record	5.41	1.153	
	StT4	Firm's homepage with sufficient information	5.47	1.022	
	StT5	On line system (e.g. booking, registration, appointment, etc)	5.26	1.232	
	StT6	Latest technology relevant for enhancement of the business operations (e.g. latest scanning system for hospital or new ATMs for banks)	5.47	1.136	
Costs performances	FPC1	Reducing customer/clients operations costs	4.78	1.146	.798
	FPC2	Attaining high employee productivity	5.30	1.046	
	FPC3	Maintaining high capacity utilization	5.29	1.074	

Table 3 disclose the inter-items' correlations for stakeholder integration, advanced operations technology and operations performances. It was found that no bivariate items exceed the value of 0.9 to indicate no multicollinearity issue. The items are separate and distinctive from one another and the significant level is at the 0.05.

Table 3
Correlation matrix for all dimensions in the study

	StI1	StI2	StI3	StI4	StI5	StT1	StT2	StT3	StT4	StT5	StT6	FPC1	FPC2	FPC3
StI1	1.													
StI2	.585**	1												
StI3	.474**	.404**	1											
StI4	.340**	.382**	.313**	1										
StI5	.450**	.383**	.417**	.455**	1									
StT1	.293**	.323**	.261**	.348**	.337**	1								
StT2	.264**	.343**	.326**	.313**	.369**	.613**	1							
StT3	.229**	.284**	.226**	.298**	.324**	.569**	.610**	1						
StT4	.326**	.343**	.307**	.285**	.278**	.481**	.518**	.470**	1					
StT5	.282**	.371**	.279**	.347**	.306**	.549**	.523**	.553**	.479**	1				
StT6	.308**	.280**	.304**	.248**	.245**	.471**	.506**	.491**	.474**	.520**	1			
FPC1	.362**	.291**	.409**	.310**	.354**	.325**	.299**	.320**	.351**	.377**	.323**	1		
FPC2	.304**	.343**	.350**	.377**	.357**	.394**	.414**	.282**	.269**	.346**	.291**	.478**	1	
FPC3	.333**	.273**	.358**	.251**	.319**	.425**	.396**	.296**	.352**	.332**	.325**	.534**	.705**	1

*** Correlation significant at the 0.01 level*

Validity of the Measurement Model

This study used the confirmatory factor analysis (CFA) to test for the measurement model. Originally, all studied factors; stakeholder integration, technology and operations performances carry 5, 6, 3 items respectively. The initial test for the measurement model is not fit. Several modifications had been performed to reach an acceptable fit model by utilizing the modification indices. Subsequent model reaches a fit model. [CFA for (stakeholder integration): Normed Chi-square=2.15, p-value=0.116, CFI=0.991 &RMSEA=0.067, technology: Normed Chi-square=1.34, p-value=0.243, CFI=0.996 and RMSEA=0.037, and for operations performances Normed Chi-square=3.167, p-value=0.075, CFI=0.992 and

RMSEA=0.093]. 2 items are omitted based to obtain a fit model. Extended discussion on the process of omitting the 2 variables are not provided here.

Those items taken form the subsequent measurement model are loaded onto the structural model which is shown in Figure 4. The factor loadings of all observed variables found to be satisfactory. They extend from 0.58 to 0.87. According to Hair et al, (2006) and Byrne (2010) the factor loadings for the manifested variables have to be above 0.50. This shows the existence of construct validity.

Results and Analysis
This section presents an analysis of both the direct and indirect effects of one construct on another. First, a full-fledged Structural Equation Modeling (SEM) analysis was performed — inspired by the views of quantitative research scholars that the SEM analysis provides adequate opportunities to examine and explore the effect of one construct on the other (Byrne, 2010; Kline, 2010). The results of the analysis indicate that the hypothesized model fits and describes the data accurately.

The analysis also reveals some crucial deductions. First, advanced technology has both direct and indirect effects on operations performances and a direct impact on stakeholder integration. Second, stakeholder integration serves as a good mediating variable between advanced technology and costs performances, exerting a direct effect on the operations performances construct. Detailed evidence of the 'goodness of fit' of the model is presented in Figure 4 and Table 4. In Figure 4, stakeholder integration constructs represented by StI1, StI2, StI3 and StI5. the five items of the advanced operations technology construct are represented by StT1, StT2, StT4, StT5 and StT6; and lastly, the three items of the costs performances construct are represented by FPC1, FPC2, and FPC3.

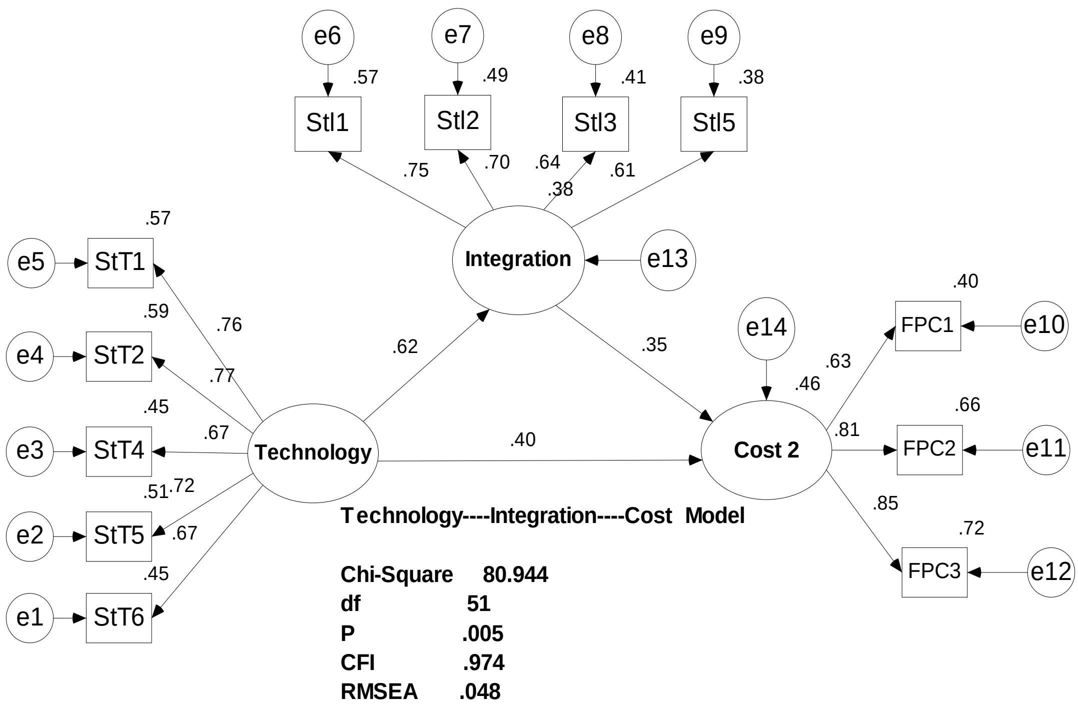


Figure 4: The Full-Fledged Structural Equation Model (SEM)

Figure 4 shows the full-fledged SEM and the resultant estimations of causal effects among the constructs. The model contains twelve items altogether for the three constructs (four for stakeholder integration, five for advanced operations technology, and three for costs performances). The model indicates a good fit for the data. The goodness of fit statistics are both statistically adequate and practically important — the Root Mean Squared Error of Approximation (RMSEA) = 0.048, and the Comparative Fit Indices (CFI and TLI) are robust (.974 & .967 respectively). Other goodness of fit indices of the model include: a Chi-square (80.994), degree freedom (51), p-value = .005, and a Normed Chi-square (Cmin/ df) = 1.588. The summary of the goodness of fit statistics of the model is displayed on the Table 4, below:

Table 4
The Summary of the Fit Statistics for the Full-Fledged SEM Model

Model	X2	df	P	Cmin/ df	RMSEA	CFI	TLI
Fit Statistics	80.994	51	.005	1.588	.084	.974	.967

The goodness of fit information contained in Table 4 supports the adequacy of the model, as they obtained statistics conform to the recommended values for a satisfactory fit of a model to data. The Norm-Chi-square (Cmin/df) is within the acceptable below of 3 (Bollen, 1989; Browne & Cudeck, 1993), the RMSEA < .08, and the CFI & TLI > .9 (Browne & Cudeck, 1993; Byrne, 2010).

All the parameter loadings of the model are practically reasonable and statistically important, implying loading coefficients that range between .61 to .85 — far greater than the recommended threshold of 0.6 (Byrne, 2010; Kline, 2005), and without any offending estimates. Inspection of estimate outputs further reveals that the hypothesized relationships among the constructs are all statistically significant. Specifically, the relationships among the three constructs (advanced operations technology to costs performances through stakeholder integration) are considered significant, as indicated by the Critical Ratio (CR) values of each of the inter-variable relationships (Byrne, 2010; Kline, 2010) greater than 1.96 (the absolute value), at an alpha level of .05.

Also revealed in the model is the evidence of direct and indirect relationships among the constructs of the model. The analysis shows that: advanced operations technology direct effect on costs performances = 0.40; advanced operations technology indirect effect on operations performances through stakeholder integration = 0.217; advanced operations technology direct effect on stakeholder integration = 0.62; and stakeholder integration direct effect on costs performances = 0.35. All effect estimates are statistically significant and logically reasonable, and their values are of an acceptable standard for evidence of direct and indirect effects (.2) (Byrne, 2010; Kline, 2005). Thus, it may be emphatically stated that this study stakeholder integration to be a good mediator between advanced operations technology and costs performances.

Conclusion

This is an empirical research involving a triangulation of advanced operations technology, stakeholder integration, and costs performances, particularly within the context of service industry in Malaysia. Previous studies had examined these constructs either discretely or in two-way relationships. The novelty of this research lies in its inclusion of stakeholder integration practices while investigating the relationship between advanced operations technology and costs performances, especially in service sector. Further, the study employed confirmatory factor analyses to produce empirically verified and validated underlying dimensions of advanced operations technology, stakeholder integration, and costs performances. The results have shed lights on both theory and practices.

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References

Ahi, A. N., Sinkovics, Y., Shildibekov, R. R., Sinkovics, N. M. (2021). Advanced technologies and international business: A multidisciplinary analysis of the literature. International Business Review in press. online 9 December 2021, 101967

Autry, C. W., Rose, W. J., and Bell, J. E. (2014), “Reconsidering the supply chain integration-performance relationship: in search of theoretical consistency and clarity”, Journal of Business Logistics, Vol. 35 No. 3, pp. 275-276.

Anderson M., and Soha, A. S. (1999) A study of relationship between quality management practices and performance in small businesses International Journal of Quality and Reliability Management. 16. 859-877

Bollen, K. A. (1989) Structural Equations with Latent Variables, Wiley, New York, NY.

Byrne, B. M. (2010) Structural Equation Modeling with Amos, Routledge, New York, London.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen and J. S. Long (Eds.), Testing structural equation models (pp. 136-162). Newbury Park, CA: Sage.)

Creswell, J. W. (2008). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Demetera, K. , Szaszb, L., Raczc, B. G. (2016) The impact of subsidiaries’ internal and external integration on operational performance International Journal of Production Economics. 182, pp 73-85

Fawcett, S. E., Fawcett, A. M., Watson, B. J., and Magnan, G. M. (2012), “Peeking inside the black box: toward an understanding of supply chain collaboration dynamics”, Journal of Supply Chain Management, Vol. 48 No. 1, pp. 44-72.

Feng, M., Yu, W., Chavez, R., Mangan, J., Zhang, X. (2017). Guanxi and operational performance: The mediating role of supply chain integration. Industrial Management & Data Systems 2017, 117(8), 1650-1668.

Gupta, Y. P., and Somers, T. M. (1996), Business strategy, manufacturing flexibility and organizational performance relationships: a path analysis approach, Production and Operations Management, 5, 3, pp. 204-233.Hair et al. (2006)

Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E., and Tatham, R. L. (2006). Multivariate data analysis (6th Eds.). Upper Saddle River, New Jersey, USA: Prentice- Hall, International Inc.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey, Hendricks, K. B., & Singhal, V. R. (1997). “Delays in New Product Introductions and the Market Value of the Firm: The Consequences of Being Late to the Market”, Management Science, 43 (4): 422-436

Jonas, J. M., & Roth A. (2017). Stakeholder integration in service innovation - an exploratory case study in the healthcare industry. International Journal of Technology Management. 73(1/2/3),.

Kano, L., Tsang, E. W., & Yeung, H. W.-C (2020). Global value chains: A review of the multi-disciplinary literature. Journal of International Business Studies, 51(4), 577–622.

Kline, R. B. (2011) Principles and Practice of Structural Equation Modeling, 3rd ed., The Guilford Press, New York.

Noh, J., and Fitzsimmons, J. A. (1999) Effect of information technology on marketing performance of Korean service firms, International Journal of Service Industry Management, Vol. 10 No. 3, 1999, pp. 307-319

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

Salam, A. (2017). The mediating role of supply chain collaboration on the relationship between technology, trust and operational performance An empirical investigation. Benchmarking An International Journal 24(2) Vol. 24 No. 2, pp. 298-317

Roloff, J., Aßlander, M. S., Nayir, D. Z. (2015) "The supplier perspective: forging strong partnerships with buyers", Journal of Business Strategy, Vol. 36 Issue: 1, pp.25-32,

Vanpoucke, E., Vereecke, A., Muylle, S. (2017) "Leveraging the impact of supply chain integration through information technology", International Journal of Operations & Production Management, Vol. 37 Issue: 4, pp.510-530,