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MEDIATING EFFECT OF INTEGRATED SYSTEMS ON THE RELATIONSHIP BETWEEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PUBLIC HEALTHCARE PERFORMANCE: STRUCTURAL EQUATION MODELING

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ABSTRACT

The performance of public healthcare facilities is critical, due to the impact on human lives. However, in Punjab, the infant and maternal mortality rates are 88 per 1000 and 227 per 100,000, respectively, while Pakistan ranks 149th in healthcare worldwide. Against these figures, the targets set in the 2018 Public Health Sector Plan, *Building a Healthier Punjab* seem overoptimistic. Hence, this study aimed to determine the mediating effect of integrated systems on the relationship between supply chain management practices and healthcare performance. Adopting a quantitative methodology, a survey questionnaire administered to 200 respondents, selected through cluster sampling from a target population 2899 in Punjab. SPSS and AMOS were used for the exploratory and confirmatory factor analyses and structural equation modeling. Following validation of the measurement model, structural equation modeling found integrated systems exerted a significant and full mediating on the supply chain management practices–healthcare performance relationship. The indications are, therefore, that integrated systems and efficient supply chain management practices enhance patients care while minimizing healthcare costs. These findings should be useful to both public and private healthcare facilities, as well as other public organizations and supply chain professionals, by providing a fuller understanding of the issues. Future research studies could further broaden this knowledge through an investigation into the impact of backlog inventories on financial performance.

Contribution/Originality: This study is one of very few investigating the mediating effect of integrated systems on the relationship between supply chain management practices and healthcare performance. The study also contributes a second-order construct model, identifying the dimensions within those constructs, to the existing literature.

1. INTRODUCTION

The performance of public (not-for-profit) healthcare facilities is fundamentally different from the private healthcare sector (Cheon, 2016): there are 13 million deaths per year worldwide due to infectious diseases, and higher numbers are common in developing countries (Rashid, Amirah, & Yusof, 2019). Therefore, public healthcare facilities purchase and stockpile the most expensive medications for future consumption, despite the risks of using out-of-date or obsolescent medicines and being unable to replenish out-of-stock items (McKelvey, 2013). For instance, with a population of 101.6 million, the State Government of Punjab allocated 168 billion Pakistani rupees to primary and secondary healthcare facilities, yet the mortality rate continues to rise due to expired and out-of-stock critical medicines: infant mortality increased from 78 per 1000 in 2008 to 88 per 1000 in 2016; maternal mortality rate was 227 per 100,000 in 2006–07, while Pakistan's ranked 149th in the World Health Organization's (WHO) 2016 Maternal Mortality Ratio Index. In fact, it was discovered that manual errors and poor inventory control in most healthcare facilities led to patients being prescribed expired medications (Rashid & Amirah, 2017). The goal of the 2018 Public Health Sector Plan, *Building a Healthier Punjab*, to bring the maternal mortality rate below 140 per 100,000 and infant mortality rate below 40 per 1000 thus seems overoptimistic (Rashid et al., 2019).

1.1. Research Question and Objectives

This study aimed to discover the strategic importance of supply chain management practices (SCMP), integrated systems (IS) healthcare performance (HP) in healthcare facilities of Punjab, Pakistan. To answer this question, empirical evidence was sought for each of the following objectives:

1. To determine the significant positive effect between SCMP and IS.
2. To determine the significant positive effect between SCMP HP.
3. To determine the significant positive effect between IS and HP.
4. To determine the mediating effect of IS between SCMP and HP.

2. THEORETICAL FRAMEWORK

A quantitative research method was used to examine the three variables: SCMP, IS mediator, and HP (Creswell, 2014). The study then adopted the resource-based view (RBV) theory to test the hypothesized relationships between these variables.

According to Peteraf and Barney (2003), RBV theory evaluates resources and performance divergence at an organizational level, with an emphasis on those resources and capabilities that improve efficiency. According to Porter (1981), those that contribute either indirectly or directly to enhancing organizational performance are viable resources (Shibin, Gunasekaran, & Dubey, 2017), which involve technology, effective processes, employee knowledge, machinery, and capital (Wernerfelt, 1984). In fact, Wade and Hulland (2004) proved that as technology improves processes, it indirectly adds value to an organization. Consequently, RBV theory provides an appropriate theoretical framework (Hsu, Tan, Kannan, & Keong Leong, 2009), as already confirmed by resource synergy in association with SCMP (Lee & Hughey, 2001).

3. LITERATURE REVIEW

Over time, SCM has become pivotal in every organization, but, as it involves immense capital and affects performance, requires managerial oversight (Samuel & Ondiek, 2014). Performance can be enhanced through increasing value, reducing costs, and monitoring operational expenses (Pritchard, Gracy, & Godwin, 2010); moreover, economies of scale, cost-effectiveness, and efficiency are essential in a competitive environment. In this case, SCMP provides a sustained and efficient supply (Baily, David, David, & David, 2005), although the failure to link the financial and functional units of SCMP will ruin performance (Shah & Shin, 2007). However, Dhodi (2018) empirically proved that IS greatly improve planning, scheduling, and production, and thus enhance stock availability and eliminate shortages. Many researchers believe integration cuts costs and develops customer care (Samuel & Ondiek, 2014), and more attention is being paid to how integration can result in benefits for enterprises (Attom, 2013).

Consequently, a model was developed based on relevant literature and RBV theory (Hsu et al., 2009; Samuel and Ondiek, 2014)), as depicted in Figure 1. Here, there is one independent variable (SCMP), one dependent variable (HP), and one mediator (IS) with which to examine the mediation effect on the relationship between the independent and dependent variables.

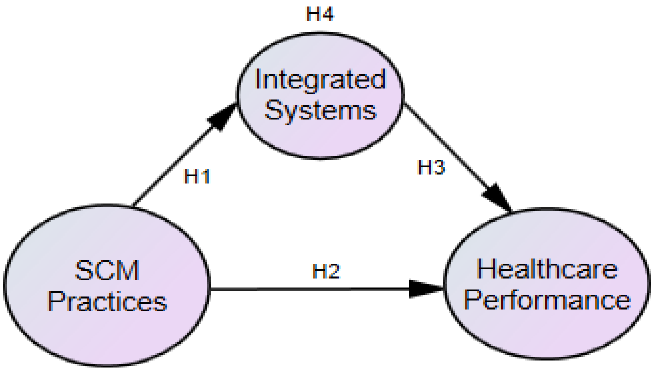

Figure-1. Proposed research model.
Source: Hsu et al. (2009); Samuel and Ondiek (2014).

3.1. Research Hypotheses

Based on the proposed research model, the following hypotheses were developed:

H1: SCMP exerts a significant positive effect on IS.

H2: SCMP exerts a significant positive effect on HP.

H3: IS exerts a significant positive effect on HP.

H4: IS exerts a mediation effect on the relationship between SCMP and HP.

4. DATA ANALYSIS AND RESULTS

A positivist paradigm is used in the current study, as it is appropriate for quantitative research (Creswell, 2014), which is suitable for empirical investigations (Given & Saumure, 2008). A questionnaire was administered to collect data on the three variables through a 5-point Likert scale (Amirah, Asma, Muda, Amin, & Him, 2019). Exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) were then performed, using IBM® SPSS® V22.0 and IBM® SPSS® AMOS™ 22, respectively, to validate a second-order construct model before testing the structural equation modeling (SEM). According to Worthington and Whittaker (2006), this two-stage process involving different sample sizes acts as a scale validation procedure. Therefore, the EFA was conducted on 100 and the CFA on 200 respondents selected via multistage cluster sampling, dividing the population into mutually homogeneous but internally heterogeneous groups (Sekaran & Bougie, 2010). Hence, one district from each of the nine Punjabi divisions provided a sampling frame of 343 healthcare facilities for this study, from which 200 were randomly selected (Lomax & Schumacker, 2004).

4.1. Exploratory Factor Analysis (EFA)

For the EFA, orthogonal rotation (i.e., Varimax) with principal axis factoring on 28 items, was used (Tabachnick & Fidell, 2014). Table 1 presents the summarized results of the rotated factor matrix for each item (from highest to lowest), of which three with factor loadings < 0.60 (SCMP4, HP6, and HP5) were excluded, leaving 25 items. Eventually, two factors for each variable with cross-loadings < 75% of any other item were reached (Field, 2013; Hair et al., 2010). Furthermore, factors were extracted on the basis of the eigenvalues-greater-than-1.0 rule (Hair, Black, Babin, & Anderson, 2010; Rashid et al., 2019).

Certain statistical assumptions were considered in the EFA. Kaiser–Meyer–Olkin (KMO) values > 0.60 were considered excellent: SCMP = 0848, IS = 0.852, and HP = 0.800. Bartlett's test of sphericity should be significant and was shown to be $p < 0.001$ (Awang, 2014; Beavers, Lounsbury, Richards, & Huck, 2013; Field, 2013). Communalities value should be > 0.2 for each item and did indicate that additional factors were not signified for each item (Child, 2006). The total variance should be > 50%: first two factors each of SCMP = 61%, IS = 60%, and

HP = 61%; moreover, the variance for the first factor of each was < 50% (Yusof, Awang, Jusoff, & Ibrahim, 2017). As a result, the final factors extracted via EFA were appropriately renamed.

Table-1. Summarized results of rotated factor matrix.

Items	SCMP Factors		IS Factors		HP Factors	
	1	2	1	2	1	2
SCMP1	0.806					
SCMP2	0.798					
SCMP5	0.797					
SCMP3	0.720					
SCMP4	0.477					
SCMP7		0.824				
SCMP8		0.821				
SCMP6		0.781				
SCMP9		0.762				
IS2			0.825			
IS1			0.808			
IS4			0.791			
IS3			0.655			
IS7				0.778		
IS6				0.727		
IS5				0.713		
IS8				0.678		
HP9					0.846	
HP8					0.834	
HP10					0.750	
HP11					0.746	
HP7					0.698	
HP6					0.491	
HP3						0.949
HP4						0.887
HP2						0.816
HP1						0.759
HP5						0.470

Notes: Extraction method: principal axis factoring; rotation method: varimax (orthogonal) rotation; factor loadings < 0.60 were excluded from further analysis; rotation converged in three iterations.

4.2. Demographic Attributes of Respondents

Table-2. Demographic attributes of respondents.

Demographic Profile	Category	Frequency (n = 200)	%
Marital Status	Single	154	77
	Married	46	23
Age (years)	20–30	141	70.5
	31–40	51	25.5
	41–50	8	4
Gender	Male	183	91.5
	Female	17	8.5
Years of Experience	15+	15	7.5
	11–15	33	16.5
	6–10	53	26.5
	2–5	87	43.5
	< 2	12	6
Educational Level	High School	23	11.5
	Diploma	52	26
	Bachelors	94	47
	Masters	17	8.5
	Other	14	7

Notes: n: number of respondents.

Table 2 shows the demographic attributes of the respondents: a far greater proportion was single (154, 77%) than married (46, 23%); the majority were aged 20–30 years (141, 70.5%), then 31–40 (51, 25.5%) and 41–50 (8, 4%); almost all were male (183, 91.5%), with very few females (17, 8.5%); their experience, in descending order of numbers, ranged from 87 (43.5%) with 2–5 years, 53 (26.5%) with 6–10 years, 33 (16.5%) with 11–15 years, 15 with over 15 years, and 12 (6%) less than 2 years experience; and finally, 23 (11.5%) completed high school, while 52 (26%), 94 (47%) and 17 (8.5%) earned their diploma, bachelor's, and master's degrees, respectively, with 14 (7%) receiving other qualifications.

4.3. Descriptive Analysis

The results from the descriptive analysis of each item and variable are shown in Table 3. The means (M) and standard deviations (SD) for SCMP (M = 4.02, SD = 0.760), IS (M = 3.91, SD = 0.834), and HP (M = 4.01, SD = 0.849) revealed that the majority of respondents "agreed" on the essential role played by SCMP and IS in HP.

Table-3. Descriptive analysis results.

Construct	Sub-constructs and Indicators	M for Item	M for Variables	SD for Variables
SCMP	InvS1: crucial items often out of stock.	4.03	4.02	0.760
	InvS2: always maintain buffer stock.	4.03		
	InvS3: vital to determine order size for inventory.	4.02		
	InvS4: most deliveries are delayed.	4.00		
	InvA5: experiencing discrepancies in stock balance.	4.07		
	InvA6: handling inaccurate inventories.	3.98		
	InvA7: physical inventory varies from system stock.	4.06		
	InvA8: ability to improve inventory accuracy.	4.00		
IS	IMS1: information management system better than manual systems.	3.90	3.91	0.834
	IMS2: information management system easily understood.	3.86		
	IMS3: computerized systems used (e.g., EDI, EPOS, and ERP).	3.78		
	IMS4: information management system improves control.	3.70		
	ITC5: information management system is more reliable.	3.92		
	ITC6: integrated systems generate orders and reduce uncertainties.	3.93		
	ITC7: collaborating with stakeholders enables accurate forecast.	3.99		
	ITC8: automated systems improve reliability of guarantees.	3.95		
HP	HPC1: hasty buying increases costs.	4.08	4.01	0.849
	HPC2: expired, obsolescent, and damaged items are in stock.	4.03		
	HPC3: inventory optimization should be determined.	4.08		
	HPC4: minimizing costs at risk of out-of-stock items affects performance.	4.09		
	HPS5: bed occupancy rate (BOR) is high.	3.36		
	HPS6: x-rays and laboratory equipment are sufficient.	3.95		
	HPS7: stock handlers are essential for quality deliverance.	3.93		
	HPS8: effective mechanisms improve clients' efficiency.	3.96		
	HPS9: overall productivity is being achieved.	3.95		

Notes: M: mean; SD: standard deviation; EDI: electronic data interchange; EPOS: electronic point of sale; ERP: enterprise resource planning.; InvS: inventory stocks; InvA: inventory accuracy; IMS: information management system; ITC: collaboration; HPS: hospital performance service quality; HPC: hospital performance cost.

4.4. Measurement Model Assessment

The assessment model involved a second-order construct model comprising three constructs and six sub-constructs, with which a pooled CFA was undertaken, being able to address any identification issues—even if a construct consists of less than four indicators (Awang, 2015). Figure 2 depicts the measurement model for assessing unidimensionality, validity, and reliability prior to SEM (Henseler, Ringle, & Sarstedt, 2014).

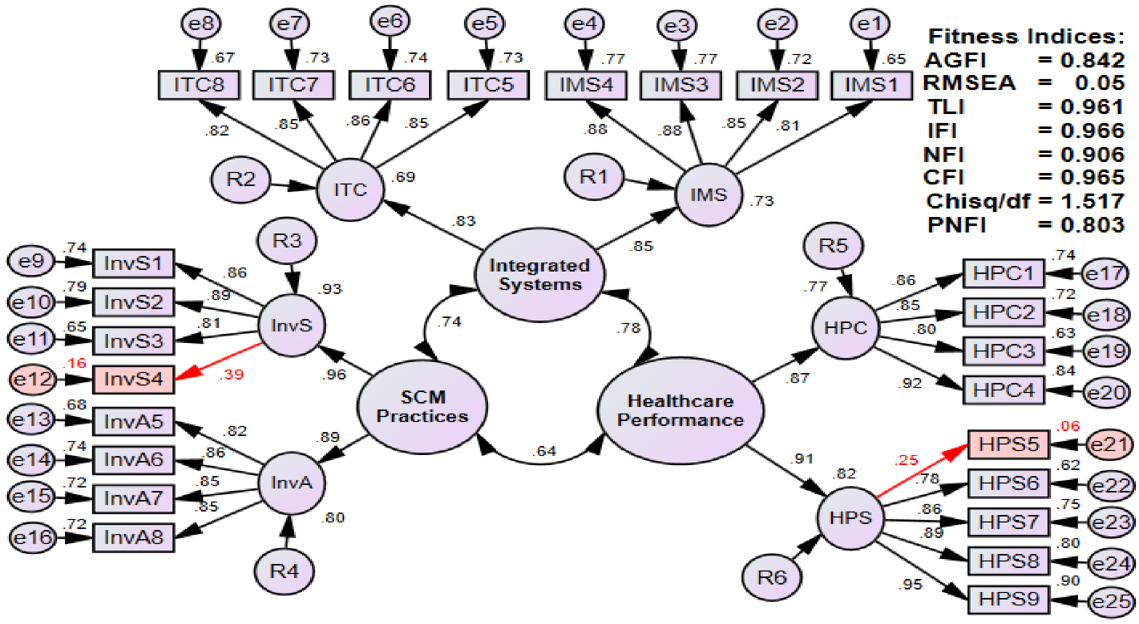

Figure-2. Measurement model for assessment.

Note: Chisq/df: chi square/degrees of freedom.

4.4.1. Unidimensionality

According to Hair et al. (2010), unidimensionality is a set of dummy variables that explain a construct. First, maximum likelihood estimation (MLE) of factor loadings was conducted (Awang, 2015), and then the two items (InvS4 and HPS5) calculated as < 0.50 were removed (see Figure 3) (Hair et al., 2010). The factor loadings of all the other items were high (> 0.70), confirming there were similarities between indicators within a single construct (Hair, Hult, Ringle, & Sarstedt, 2013).

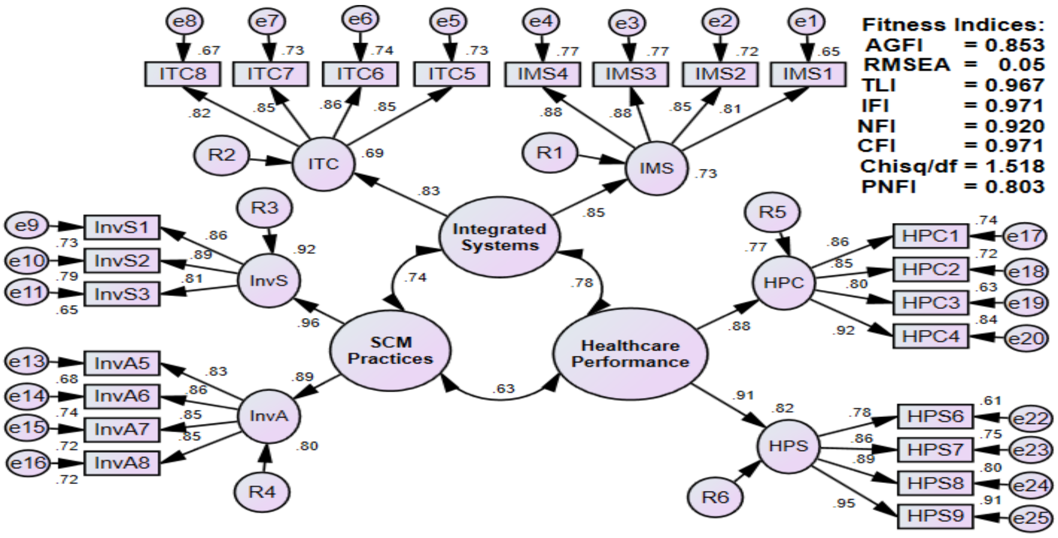

Figure-3. Measurement model after achieving unidimensionality.

Validity and reliability were then assessed through average variance extracted (AVE) and composite reliability

(CR). As the results sufficed the recommended levels, those items with factor loadings between 0.40 and 0.70 did not need to be removed (Hair, Ringle, & Sarstedt, 2011).

4.4.2. Validity

Three types of validity tests were conducted on the measurement model: construct, convergent, and discriminant (Henseler et al., 2014).

4.4.2.1. Construct Validity and Reliability

Construct validity measures accuracy through three categories of goodness-of-fit indices: parsimonious, incremental, and absolute fit (Hair et al., 2010). The most cited and recommended indices are listed in Table 4; Figure 3 also suggests indicators specific to the measurement model for each of these indices. All the indicators in each category confirmed goodness of fit for the model: AGFI = 0.85 ≥ 0.80 and RMSEA = 0.05 ≤ 0.08 verified absolute fit; TLI, IFI, and CFI = 0.97 ≥ 0.90 and NFI = 0.92 ≥ 0.90 validated incremental fit; while parsimonious fit was proved by chisq(x^2)/df = 1.52 (1.00–5.00) and PNFI = 0.80 > 0.05. Nevertheless, various other tests were necessary, which are detailed later in this paper.

Table-4. Goodness of fit indices for measurement model.

Category	Index	Level	Cited
Absolute fit	AGFI	≥ 0.80	Chau and Hu (2001); Jöreskog and Sörbom (1993)
	RMSEA	≤ 0.08	Hair et al. (2010)
Incremental fit	TLI	≥ 0.90	Bagozzi and Yi (1988); Tucker and Lewis (1973)
	IFI	≥ 0.90	Bollen (1990)
	NFI	acceptable ≥ 0.80	Bentler and Bonett (1980)
	CFI	≥ 0.90	Bagozzi and Yi (1988); Hair et al. (2010); Byrne (2010)
Parsimonious fit	x^2/df	1.00–5.00	Kline (2010)
	PNFI	> 0.05	Bentler and Bonett (1980)

Notes: AGFI: adjusted goodness of fit index; RMSEA: root mean square error of approximation; TLI: Tucker–Lewis index; IFI: incremental fit index; NFI: normed fit index; CFI: comparative fit index; x^2/df: chi square/degrees of freedom; PNFI: parsimony normed fit index. At least one fitness index should be selected from each category (Hair et al., 2010).

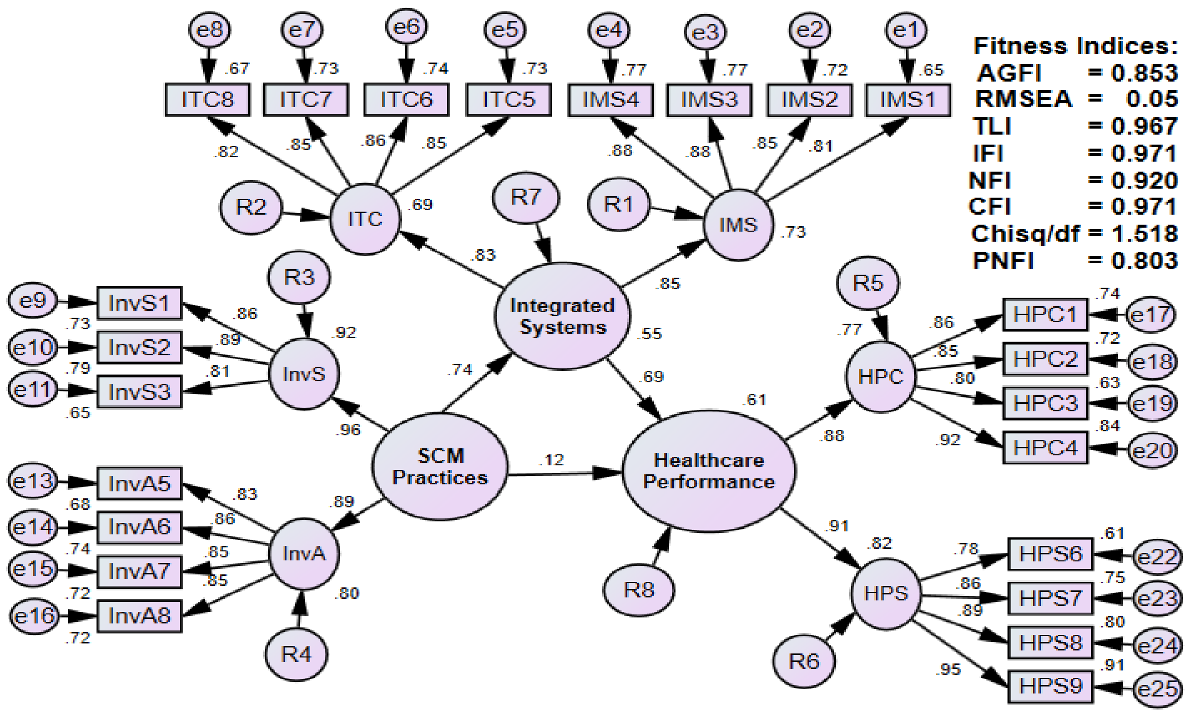

Figure-4. Structural equation modeling.

Table-5. Validity and reliability test results for full model.

Construct	Sub-Constructs and Indicators	α	Std β	CR	AVE
SCMP	InvA:	0.932	0.894	0.947	0.721
	InvA5		0.825		
	InvA6		0.862		
	InvA7		0.850		
	InvA8		0.848		
	InvS:		0.959		
	InvS1		0.857		
	InvS2		0.891		
	InvS3		0.807		
IS	IMS:	0.923	0.853	0.954	0.722
	IMS1		0.807		
	IMS2		0.846		
	IMS3		0.760		
	IMS4		0.879		
	ITC:		0.829		
	ITC5		0.852		
	ITC6		0.863		
	ITC7		0.852		
	ITC8		0.821		
HP	HPC:	0.941	0.877	0.960	0.751
	HPC1		0.858		
	HPC2		0.850		
	HPC3		0.796		
	HPC4		0.919		
	HPS:		0.905		
	HPS6		0.784		
	HPS7		0.863		
	HPS8		0.895		
	HPS9		0.952		

Notes: α: Cronbach's alpha; Std β: standardized estimate; CR: composite reliability; AVE: average variance extracted. AVE for the second-order model = averaging the squared multiple correlations for the first-order indicators.

In addition, CR and Cronbach's α were calculated for each construct, as shown in Table 5, the results of > 0.70 for each coefficient confirming the reliability of all three constructs (Hair et al., 2010).

4.4.2.2. Convergent Validity

Convergent validity is the degree to which a measure correlates positively with alternative measures of the same construct (Hair et al., 2013) and is tested by calculating AVE. The recommended value of ≥ 0.50 (Hair et al., 2010) shows that, on average, the construct describes more than half of the variance in its indicators (Hair et al., 2013), which the results in Table 5 satisfy for all constructs.

4.4.2.3. Discriminant Validity

Discriminant validity evaluates the latent constructs for differentiates (Hair et al., 2010) by comparing the AVE with its squared correlation for each construct (Henseler et al., 2014). Table 6 indicates that there were multicollinearity issues with the measurement model, as the diagonal values are higher than those in columns and rows, which are all < 0.85, as recommended by Awang (2015).

Table-6. Discriminant validity index.

Construct	SCMP	IS	HP
SCMP	0.849		
IS	0.741	0.850	
HP	0.628	0.776	0.867

Notes: Diagonally, figures represent the square root of the AVE; otherwise, they represent the squared correlations.

4.4.3. Normality Test

According to Awang (2015), robust measures of normality are skewness and kurtosis, with recommended values between -1.0 and +1.0. The results for a sufficiently sized sample of 200 in the current study fell within the recommended range, with a critical region (CR) of < 8.0 for skewness and < 3.0 for kurtosis. As the data distribution proved to be normal, it was considered acceptable for SEM (Awang, 2015).

4.5. Structural Equation Modeling (SEM)

4.5.1. Hypothesis Testing: Direct Hypotheses H1, H2, and H3

The direct hypotheses were supported by SEM (Figure 4). Table 7 indicates that SCMP affects IS and HP positively (H1 and H2), and likewise IS on HP (H4). Moreover, the empirical values revealed that IS exerted a stronger effect than SCMP on HP.

Table-7. Structural path analysis results (direct hypotheses).

Hypothesis	Path	Std β	SE	CR	Results
H1	IS ← SCMP	0.742***	0.085	8.055	Supported
H2	HP ← SCMP	0.613***	0.085	6.226	Supported
H3	HP ← IS	0.779***	0.110	7.819	Supported

Notes: SE: standard error; CR: critical ratio; ***, $p < 0.001$.

4.5.2. Mediation Assessment: Hypothesis H4

The method suggested by both Field (2013) and Awang (2014) was followed to assess the mediation effect: path *c* (the direct effect) was examined before path *c'* (the indirect effect). The standardized estimates for paths *a*, *b*, and *c* were statistically significant, as can be seen in Table 8, revealing the existence of a mediation effect. Once the mediator (IS) was introduced the standardized estimate of 0.0613 for path *c* was abridged to 0.116 for path *c'* and was no longer significant, indicating full mediation had occurred. Furthermore, the results fulfilled Awang's (2014) criterion for a mediation effect: multiplying paths *a* and *b* produced a value greater than path *c'* that was not significant, confirming not only mediation but full mediation. The indirect hypothesis (H4) was thus supported.

Table-8. Mediation assessment results (IS in SCMP and HP).

Hypothesis	Path	Relationship			Std β	SE	CR
H4	Path *c*	HP	←	SCMP	0.613***	0.085	6.226
	Path *a*	IS	←	SCMP	0.741***	0.082	7.986
	Path *b*	HP	←	IS	0.690***	0.149	4.924
	Path *c'*	HP	←	SCMP	0.116 (ns)	0.111	0.979
	path *a* x path *b*				0.511 (ns)	**Full Mediation** since direct effect (*c'*) is not significant	
	path *a* x path *b* > path *c'*				Mediation occurs		

Notes: ***, p < 0.001; (ns): not significant.

4.5.3. Bootstrapping: Direct and Indirect Effects

Bootstrapping is another highly recommended technique to examine the mediation effect (Awang, 2014; Preacher and Hayes, 2004). The bootstrapping results in Table 9 shows the standardized estimate (0.512) of the indirect effect to be statistically significant, while the 95% percent boot CI does not cross 0 (LL = 0.316, UL = 0.926), which demonstrates a mediation effect. In addition, the non-significant standardized estimate of the direct effect illustrates a full mediation effect verifies that H4 is supported.

Table-9. Bootstrapping results.

Hypothesis	Path	Std β (DE)	Std β (IE)	LL	UL	Decision
H4	SCMP → IS → HP	0.116 (ns)	0.512***	0.316	0.926	Supported

Notes: DE: direct effect; IE: indirect effect; LL: lower limit of confidence interval; UL: upper limit of confidence interval; ***, p < 0.001.

4.6. Coefficient of Determinants (R^2)

The coefficients of determination suggested that 61% of HP could be predicted through SCMP and IS, while 55% of IS could be predicted through SCMP. According to Cohen (1988) and Urbach and Ahlemann (2010), a substantial R^2 value increases the predictive ability of the model, and as can be seen from Table 10, the R^2 values in the current study can be considered substantial based on (Cohen (1988) and Falk and Miller 91992).

Table-10. Recommended substantial values of R^2.

Cohen (1988)	Falk and Miller (1992)	Chin (1998)	Hair et al. (2013)
≥ 0.26	≥ 0.10	≥ 0.65	≥ 0.75

Notes: Most cited substantial R^2 values.

4.7. Effect Size (f^2)

Effect size evaluates how adequate the effect of latent exogenous constructs are on a latent endogenous construct by first omitting a relevant exogenous construct and then estimating the path model twice (f^2 = (R^2 included − R^2 excluded) / (1 − R^2 included) (Gefen & Rigdon, 2011; Hair et al., 2010). As Cohen (1988) states that effect size ≥ 0.02 is small, ≥ 0.15 is medium, and ≥ 0.35 is large, the current study found a large effect size (0.59) for SCMP on HP.

5. DISCUSSION

Having developed a second-order construct model and validated it for structural equation modeling, the three main latent constructs were examining in terms of the study's objectives:

Objective 1: This was addressed by testing hypothesis H1. Results from SEM found that SCMP did exert a significant positive effect on IS, as well as proportionate to each other. This finding is consistent with Ondari and Muturi (2016) and Rashid (2016).

Objective 2: This was addressed by testing hypothesis H2. The SEM results found that SCMP did exert a statistically significant positive effect on HP: improving SCMP will enhance HP. This finding is supported by those of Peng, Quan, Zhang, and Dubinsky (2016) and Sutduean, Joemsittiprasert, and Jermsittiparsert (2019).

Objective 3: Testing hypothesis H3 through SEM revealed that IS exerted a statistically significant positive effect on HP: improvements to IS will improve HP. This finding is similar to those of Gurmu and Ibrahim (2017) and Ahmad and Zabri (2018).

Objective 4: Using SEM to test hypothesis H4 determined a significant and full mediating effect on the relationship between SCMP and HP. This confirmed the findings of Rehman, Mohamed, and Ayoup (2019).

6. CONCLUSION

6.1. Research Contribution and Implications

State-funded hospitals play an important role in public health; however, they are susceptible to failure due to inventory maladministration in the pharmacy and laboratory. Thus, relevant research on healthcare facilities in Punjab was required, and SCMP, IS, and HP were integrated into a second-order construct model based on RBV theory.

The findings contribute to both the body of literature and RBV theory to develop a more comprehensive understanding of healthcare performance. The main focus of this study follows the global trend in research: the mediating role played by integrated systems in supply chain management and organizational performance. However, the concept still lacks management support in the public sector, especially the healthcare sector in Pakistan. Consequently, the findings from the current study will assist public healthcare facilities, as well as pharmaceutical companies, multifunctional organizations, and government bodies, to adopt integrated systems that enable the implementation of supply chain management practices to enhance organizational performance.

6.2. Research Limitations and Recommendations for Future Research

Integrated systems act as a mediator between supply chain management practices and healthcare performance to produce positive and significant effects in Punjab, Pakistan; without them, healthcare facilities are unable to maintain accurate inventories of medicines and laboratory equipment, which could lead to higher mortality rates. However, this study had several limitations: only three variables were examined, and future studies should test either other variables or different dimensions of the same variables; the data was based on perceptions rather than absolute values; the study was restricted solely to Punjab; and the researchers worked within a limited time frame and budget, and faced restricted access to relevant departments and poor recordkeeping at healthcare facilities.

Finally, it is recommended that future research studies should consider stakeholders' input in the decision-making process and include respondents from community healthcare, the pharmaceutical industry, and the private sector for more comprehensive results. In addition, researchers could investigate the relationship between backlog inventories, procurement strategies, and operational performance.

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