SPCRD GLOBAL PUBLISHING Sustainable Solutions
READS Review of Economics and Development Studies
Journal homepage: http://reads.spcrd.org ISSN (Print): 2519-9692 ISSN (Online): 2519-9706

Role of Professional Skills in Promoting Healthcare System: A Performance Perspective

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ARTICLE DETAILS

History:
Accepted 10 May 2022
Available Online June 2022

Keywords:
Professional Skills, Coproduction, Healthcare, Performance, Workflow Efficiency

JEL Classification:
J24, K32

DOI: 10.47067/reads.v8i2.443

ABSTRACT

This paper aims to investigate the impact of sustainable practices especially sustainable production and sustainable supplier management on supply chain performance. This empirical study demonstrates the contextual examination of sustainable practices especially with reference to an emerging economy like Pakistan. Survey was employed to collect data from 100 Food Manufacturing Firms. Exploratory Factor Analysis and Structure Equation Modeling were used through AMOS to test hypothesis. The results reveal that sustainable production and sustainable supplier management both significantly impact triple bottom line. However, sustainable production generates stronger impact on social performance, while, sustainable supplier management significantly effects environmental performance. Additionally, the findings provide valuable insights regarding the use of sustainable production and sustainable supplier management and their impact on supply chain performance. Finally, it propagates utility of ecological value chain management mentioning the impact of couple of sustainable practices on tipple bottom line.

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1. Introduction

Pakistan has been striving to improve the healthcare system and has developed many strategies and reforming programs. Pakistan has also joined hands with international and national NGOs further to speed up the process of healthcare services betterment. The healthcare sector of Pakistan includes public and private stakeholders, delivering medical facilities at primary, secondary, and tertiary care centers. Public hospitals and medical institutions are government-operated. These are supported with government funding and provide free healthcare services to the citizens. The private healthcare sector provides health services to above 71% of the population. Because most private hospitals are profit-oriented, they try to offer better health services to patients than the public sector. The Pakistan Social and Living Standards Measurement (PSLM) survey shows that 67.4% of Pakistani families seek suggestions from private doctors (PBS, 2021).

Pakistan's health service framework is struggling with various rudimentary difficulties. It is essential to reconsider the structure of the medical services segment to bring dynamic advancements. In the past few years, the health sector has introduced a promising National Health Vision 2016-2025 to deliver essential healthcare services to all populations and meet the Sustainable Development Goals 2025 (Kumar & Bano, 2017). With the emergence of the COVID-19 outbreak, it has become critical for patients living in remote places to receive healthcare services and consultations without necessarily being present at healthcare centers. As a result, more resilient and improved healthcare systems are needed in the post-COVID-19 age, with added operational, communication, and technical support through advanced digital techniques to cater requirements of doctors and the nursing staff (Chigurupati et al., 2020).

Pakistan is the world's sixth most populated country, and health reserves are insufficient to meet the needs of the people. Pakistan is one of 57 nations with a significant shortage of health workers (Rana, Sarfraz, Kamran & Jadoon, 2016). A GALLUP report structured upon the Pakistan Economic Survey held in 2015-16 indicates that the number of hospitals in the country in 2015 was 1,167. Along with those hospitals were 5,695 dispensaries, 5,464 basic health units (BHUs) or sub-health centers, 733 centers for child health and maternity issues, and 675 rural health centers. The total number of beds was 118,869, and its availability for the general public was 1,613 per bed. In Pakistan, the doctor-to-patient ratio is 1:1300, the doctor-to-nurse ratio is 1:2.7, and the nurse-to-patient ratio is 1:20 (Nishtar, 2006). The Human Development Index (HDI) ranks Pakistan 154th out of 187 countries (UNCP, 2021). The country's healthcare sector lacks integration and utility of IT health applications, compulsory healthcare supplies, and electronic health record maintenance systems (Punjani et al., 2014). Furthermore, the availability of eHealth services is limited in Pakistan due to inconsistent technological execution and a dearth of eHealth infrastructure development planning (Kumar & Bano, 2017).

With the emergence of technology, the healthcare sector evolved from paper-based to paperless systems. E-Health uses IT and digital communication to enhance the approach, efficiency, efficacy, and quality of medical and corporate procedures used by healthcare organizations and the healthcare workforce. It involves gathering, analyzing, and disseminating information to provide care services. eHealth, or digital health, is an essential instrument to assist nations in establishing secure, effective, and sustainable healthcare delivery systems (WHO, 2021); globally, the fast growth of ICT and eHealth efforts promotes changes in care services systems (Lapão & Dussault, 2017). It is additionally critical that most of the investigations about eHealth and its successful reception and use have been done in both developed (Alvarez, 2004; Eysenbach, 2001) and developing states (Braa et al., 2004; Mosse & Sahay, 2003). The growing use of IT technologies in health care is an emerging, developing, and underrepresented sector for coaching and capacity development for health professionals.

In today's demanding environment, Information Systems (IS) have received much attention in the healthcare business to improve healthcare facilities' efficiency and effectiveness (Safdari et al., 2014). Rapid and comprehensive improvements in medical technology have made electronic health information system management, or e-HMISs, a priority for care services (Saghaeiannejad-Isfahani et al., 2015).

The failure to execute a sustainable national health system with increasing population figures has emphasized the need for a robust e-HMIS. The pandemic health emergency of COVID-19 in developing countries also called attention to a robust health performance system. The critical issues regarding smart governance depend on three attributes: firstly, management should use smart technological devices for executing different public service tasks (Madon et al., 2007). Likewise, the Government of Pakistan (GOP) has operationalized "Khidmat Markaz," a national identification system and computerized passport system. The expansion towards smart governance linked all these databases for exploring economic development tools. Economic indicators worldwide showed a transformation in industrialization from service to specialized products with value-added services. Thirdly, governance in the 21st century calls for a set of rules to supervise citizen protection privacy policies that require a privacy-based design method. Such smart governance enables private and public institutes to create and share a free market that utilizes general citizen information with various stakeholders and specific citizen information with specialized public service providers and strictly uses this information (Cordella & Willcocks, 2012).

2. Factors for a Sustainable Healthcare System

There is a requirement for social capital and capabilities to advance eHealth. The training, knowledge, and consciousness of professionals and doctors regarding the utilization of IT applications and their applicability in hospitals can be developed gradually and sustained by providing appropriate instruments and apparatus and suitable training on regular spans for progressively immediate access to the information available on the web. Malik et al. (2009) critiqued that the slight utilization of the web by the healthcare experts of developing countries like Pakistan is more often a direct result of inappropriate instruments and gadgets and deficiency of appropriate training programs on the subject of eHealth systems. Kimaro and Nhampossa (2004) discussed that eHealth ventures in developing nations are often fruitless because of IT experts' deficiency, information, and capability in eHealth frameworks. IT experts require training and instruction to utilize all eHealth applications successfully. Qazi and Ali (2011) illustrated that training is a continuous component, and healthcare experts should be well-trained.

2.1 Professional skills

Katz (1955) proposed that efficient management systems depend on three essential personal skills: technical, human, and conceptual. Katz claimed that these abilities are distinct from attributes or qualities. Individuals acquire skills to function and accomplish their objectives or goals, but characteristics or traits define their inherent selves. The capacity to use one's knowledge and talents to achieve goals or objectives is called skill. Katz (1955) first introduced these three skills approaches and postulated that these skills (Conceptual, human and technical) provide a basis for individual efficiency and performance in any working environment. Later work by Mumford et al. (2007) supported Katz's work by further adding that functional or strategic skills are aligned with conceptual skills while interpersonal or communication skills are aligned with human skills. Katz's model is described as the best framework for the capacity development of employees (Griffith et al., 2019).

Shiferaw et al. (2020) studied the TS of clinical practitioners in public hospitals. They concluded that it increases the healthcare provider's capacity to perform the care activities by increasing their knowledge of the IT system. Bjerrum et al. (2018) recommended that simulation-based IT systems are beneficial in acquiring TS for healthcare personnel. Robinson and Kersey (2018) concluded that physicians' training programs on Electronic Health Records (EHR) systems significantly influence care quality, accuracy, and safety. Melby et al. (1997) also suggested a significant relationship between healthcare staff CS and care service efficiency. Such as, physician CS must be maintained with the advancement of health systems into the digital era since the lack of synchronous and asynchronous CS limits the technologies' potential added value (Lum et al., 2020; van Galen et al., 2019). Waheed et al. (2021) examined the influence of functional capabilities on employee effectiveness in the healthcare industry and found a significant association. In another study, Karatepe et al. (2007) showed that the service industry's self-efficacious frontline employees (FLEs) perform their jobs at elevated levels. Peña et al. (2016) also specified that FS could improve workflows, value co-creation, and system performance in healthcare. Parra-Rizo and Sanchis-Soler (2020) also confirmed that individuals with FS face fewer difficulties performing their responsibilities and getting along with others.

H1a-c: Professional skills (functional, Technical, Communication) directly impact Health System Performance

2.2 Workflow Efficiency and Coproduction

Rezai-Rad et al. (2012) explain that to deal with clients' relevant concerns and maintain an average utilization of ICTs in health associations, medical services providers must be offered a chance to participate in information systems improvement processes incorporating the IS substance as indicated by their necessities. Coproduction is often regarded as a viable approach for addressing critical difficulties in the health sector (McMullin & Needham, 2018; Voorberg et al., 2015), where resources are severely limited. Coproduction also pressures healthcare systems by posing a long-term threat if resources are not blended. For this purpose, researchers have pushed for more individualized care based on new relational models in which informal carers and local communities share duties with care professionals, allowing people to feel like team members and improving service quality (Marsilio et al., 2021). First-line healthcare professionals actively collaborate with healthcare stakeholders such as health providers, general practitioners, social services, and others to coproduce the care services (Agyepong et al., 2021; Turk et al., 2021).

H2a-c: Professional skills (functional, Technical, Communication) directly impact coproduction in the healthcare system

Critical organizational issues such as teamwork, work demands, Information Technology, and structure within healthcare operations can impact clinician efficiency. Furthermore, intensive care's dynamic nature necessitates doctors to change their jobs often while executing patient care activities (Bastian et al., 2016). As a result, a deeper understanding of the numerous parts that make up workflow is an integral part of process optimization. Efficient workflow describes how tasks and responsibilities in an organization are done with the help of the best available technology and methods to avoid delays and unnecessary resources (Carlisle et al., 2020). Understanding the interrelationships influencing and shaping workforce behavior can help healthcare operations drive workflow efforts. Healthcare practitioners can more quickly identify the leverage points leading to desired workflow results if they have a deeper grasp of the health information management system and its aspects (e.g., processes, information).

The work of Denton et al. (2018) explored the effect of electronic health records (EHRs) on workflow efficiency (WE) of clinics and associated performance standards. The authors determined that IT-based systems like EHR improve the workflow of clinics, patient safety, and quality of care services. Similarly, Holman et al. (2016) investigated the primary care physicians' (PCPs) workflow and their effect on care performance and patient relationships by concluding that ICT platforms played a vital role in improving care efficiency. Lapão and Dussault (2017) reviewed the past literature on e-health and its effect on care service staff efficiency. The authors disclosed that e-health improves clinical decision-making, disease management and control, and workforce efficiency. Moreover, Bastian et al. (2016) developed a three-phase framework model for hospitals to identify and categorize different workflows for better quality care. The model proved worth supporting the care staff to improve workflow efficiency.

H3a-c: Professional skills (functional, Technical, Communication) directly impact Workflow Efficiency in the healthcare system

3. Methodology

In line with the quantitative study, this part of the research examines the impact of required professional skills, workflow efficiency, and coproduction on the performance outcomes of e-HMIS. This research work is based on primary data collection and quantitative methodological choice. The data is collected through a structured survey instrument from the frontline employees working in the public hospitals of big cities in Pakistan through a questionnaire. The study variables were identified, and all the measurement scales for variables were adopted, i.e., FS (7-items), TS (8-items), CS (7-items), WE (7-items), CP (11-items), and HP (6-items), were developed and validated by the researchers as a part of the Higher Education Commission of Pakistan's research project *"A Step Towards Smart Hospitals: Sustainable Health Information System from Big Data Perspective*" and the same were adopted for this study. Each construct was measured on a five-point scale from "1=strongly disagree" to "5=strongly agree".

The participants of this study were frontline workers who operate computerized healthcare management information systems and have the necessary computer literacy to use the IT-based databases. Employees aged 25 years or above were considered the target sample to obtain reliable and meaningful responses. Almost half of the respondents were 25-30 years old, and the rest were aged above 30 years. Most of the respondents, i.e. almost 48.4%, had an intermediate education level, and the rest were qualified with a bachelor's 16.3%, a master's 29%, and above master's 6.3%.

Table 1: Demographics profile

Age in Years	**Frequency**	**Percent**	**Gender**	**Frequency**	**Percent**
25-30	85	53.5	Male	90	56.60
31-35	39	24.5	Female	69	43.40
36-40	10	6.3			
Above 40	25	15.7			
Experience in Years			**Education**		
Less than 5	83	52.21	Intermediate	77	48.4
5-10	30	18.86	Bachelor	26	16.3
11-15	29	18.23	Master	46	29
More than 15	17	10.70	Above master's	10	6.3

4. Results

Exploratory factor analysis is a statistical technique to refine the construct measurement scales by reducing the number of items utilized. EFA is a necessary procedure in the development of scales for questionnaires. It is also used to explore the multidimensionality of the constructs. EFA divides the items of a construct to statistically and theoretically meaningful sub-dimensions to help define the concepts and better empirical investigation. EFA for this research work was conducted on the collected data using Statistical Package for Social Sciences (SPSS) V.22. software. The objective of EFA was to recognize the items in the questionnaire that significantly loaded the constructs. Secondly, future researchers assessed the underlying multidimensionality of the constructs for better application in the Pakistani healthcare sector or similar contexts.

Principal Components Analysis was employed with varimax factor rotation. The number of items was retained based on the commonalities, which should be ≥ 0.5 (Mitra & Datta, 2014). At the same time, the number of factors was kept by assessing the (i) eigenvalue criteria (eigenvalue should be >1) and (ii) cumulative variance explained by the factor, which should be more than 50%.

The Kaiser-Meyer-Olkin (KMO) test value of 0.784 was attained for functioonal skills, which is considered suitable for sampling adequacy (≥0.6 value is deemed to be good). Two factors were achieved with more than one eigenvalue. The first factor with an eigenvalue of 3.201 explained 33% of the total variance. The second factor with eigenvalue 1.207 explained more than 29% of the total variance. The first two factors explained more than 62% of the cumulative variance. The KMO test value of 0.739 was attained for Communication skills considered good for sampling adequacy (Table-2). The Bartlett's Test of Sphericity for communication skills was also significant, with a Chi-Square value of 457.306 at the significance level of 99%. Two factors hold eigenvalue above one. The first factor with an eigenvalue of 3.306 explained 34% of the total variance. The second factor with eigenvalue 1.391 explained more than 32% of the total variance. These two factors explained above 67% of the cumulative variance.

The KMO test value for the technical skills construct was 0.812, which is considered a good indicator of sampling adequacy (Table 2). The Bartlett's Test of Sphericity for Technical skills was also significant, with a Chi-Square value of 676.398 at the significance level of 99%. Varimax factor rotation with Kaiser Normalization was performed to refine the dimensions of technical skills. The rotated component matrix presented in table-25 depicts that TS1, TS2, TS3, and TS8 formed component 2. Component 1 consisted of TS4, TS5, TS6, and TS7. The items loaded on the second factor were related to the user's knowledge about and familiarity with information and communication technology and e-HMIS, so it was named "Tech-Familiarity." Sample items include "I am familiar with ICT (information and communication technologies)" (TS7). Items in the first component were about the system operating skills of e-HMIS users. For example, "I can troubleshoot software-related issues" (TS5). Thus, the second factor was termed "Operating Skills."

The KMO test value for the Coproduction construct was 0.762, which is considered suitable for sampling adequacy (table-2). The Bartlett's Test of Sphericity for Technical skills was also significant, with a Chi-Square value of 855.737 at the significance level of 99%. The first factor with an eigenvalue of 4.455 explained >21% of the total variance. The second factor with eigenvalue 1.572 explained more significant than 20% of the total variance. The third factor with an eigenvalue of 1.454 explained almost 20% of the variance, whereas, the fourth factor with an eigenvalue of 1.034 explained approximately 16% of the total variance. These four factors explained above 77% of the cumulative variance. Varimax factor rotation with Kaiser Normalization was performed to improve the dimensions of coproduction. The rotated component matrix below depicts that CP9, CP10, and CP11 formed component 1. Component 2 consisted of CP4, CP5, and CP6. The third factor contained the items CP1, CP2, and CP3. The final dimension of coproduction loaded item numbers CP7 and CP8. The items loaded on the first factor were related to the user's self-efficacy to coproduce in e-HMIS implementation, named "User Self-efficacy." Sample items include "I am capable of providing constructive suggestion to improve health information system." (CP9). The second component loaded items related to the consideration by the organization of the users' role in the coproduction process. For example, "My organization often asks my opinion for potential changes" (CP5). So, the second component was named "consideration." The third factor contained questions about the organization, user responsiveness, and knowledge sharing and hence was called "knowledge sharing." The example item is "My organization promptly responds to my queries" (CP3). The fourth factor containing items CP7 and CP8 was awareness of challenges such as cost, and time needed in the coproduction process. Thus, it was called "awareness." The sample item is "I know that coproduction process is demanding/effort-full" (CP8)

The KMO test value for the "Healthcare System Performance" construct was 0.775, which is considered good for sampling adequacy. The Bartlett's Test of Sphericity for Technical skills was also significant, with a Chi-Square value of 321.866 at the significance level of 99%. To improve the dimensions of the construct "workflow efficiency," Varimax factor rotation with Kaiser Normalization was performed (table-43). The rotated component matrix below depicts that HP4, HP5, and HP6 formed the first component. In contrast, the second factor was loaded with HP1, HP2, and HP3. The first factor loaded items about the operational sustainability of the healthcare system performance, e.g., "Improve energy (electricity) efficiency" (HP6). Hence, it was identified as an "Operational sustainability" performance. Items in the second component were about the increase in the economic sustainability of the healthcare system due to e-HMIS. For example, "Increased the hospital revenues." (HP2). The second factor was termed "Economic sustainability" performance.

Table 2: Principal component analysis for Healthcare performance system

Motive (Eigen-value)	*KMO*	*Bartlett's Test*	*Variance explained*	*Cronbach's Alpha*	*Composite Reliability*
Functional Skills	.784**	351.245**		0.805	0.860
Problem Solving Skills			33.088		
Analytical Skills			29.882		
Communication Skills	.739**	457.306**		0.809	0.862
User-Oriented			32.940		
Other-Oriented			34.161		
Technical Skills	.812**	676.398**		0.876	0.901
Operating Skills			36.474		
Tech-Familiarity			32.113		
Coproduction	.762**	855.737**		0.836	0.870
User Self-Efficacy			21.373		
Consideration			20.088		
Knowledge Sharing			20.003		
Awareness			15.953		
Workflow Efficiency	.750**	495.753**		0.832	0.875
Efficiency			39.363		
Effectiveness			28.275		
Healthcare System Performance	.775**	321.866**		0.772	0.846
Operational sustainability			36.478		
Economic sustainability			33.230		

The results revealed that Cronbach's alpha values for all the six constructs were greater than 0.70, ranging from 0.772 to 0.876, which fulfilled the statistical cut-off criteria recommended by the researchers (Rahimnia & Hassanzadeh, 2013). Composite reliability is another measure to assess the reliability and internal consistency of the construct and the items loaded on it, similar to Cronbach's Alpha (Netemeyer et al., 2003). It indicates the cumulative shared variance that all the items of a specific construct combinly explain in that construct. Logically, the observed items intended to measure their latent construct should demonstrate a good amount of variance to be called adequate representatives of the latent construct. According to Hair et al. (2017), the composite reliability value should be greater than 0.70. the results presented in table-2 depict that all the six measures were found to have good reliability values of CR>0.70 (Hair et al., 2017). The values ranged from 0.846 to 0.901, where the construct of technical skills had the highest composite reliability of 0.901.

Table 3: R Square

Construct	R Square	R Square Adjusted
Coproduction (CP)	0.312	0.299
Workflow Efficiency (WE)	0.333	0.320
Performance of Healthcare system (HP)	0.516	0.500

The value of R-Square is a statistical measure that indicates the proportionate amount of variance that the independent variable predicts in the independent variable. The R-Square value of 0.25, 0.50, and 0.75, represents a weak, moderate, and substantial variation (Hair et al., 2017). The Table-3 shows that Coproduction, Workflow Efficiency, and healthcare system Performance had an R Square value of 0.367, 0.312, 0.333, and 0.516, respectively. The total effects Table-4 shows the cumulative effects of functional skills on coproduction (β=0.362 and p <0.001), workflow efficiency (β=0.404 and p <0.001), and healthcare system performance (β=0.218 and p <0.001). Thus, the good functional skills of e-HMIS users can enhance the positive outcomes through increased coproduction and workflow efficiency, which can, in turn, have positive impacts on overall healthcare system performance through e-HMIS. Technical skills are also significant predictors of workflow efficiency while utilizing an e-HMIS with a β coefficient of 0.194 at p > 0.001. Similarly, the most significant impact of technical skills of e-HMIS users is finally on the improvement of healthcare system performance, which is also previously seen in the direct and indirect effect results. Thus, the technical skills of e-HMIS users are a source of better healthcare system performance due to a statistically significant coefficient.

Table 4: Total effect of proposed hypotheses

Hypotheses	Sample Mean	T-value	Confidence Interval	
			2.5%	97.5%
Functional Skills -> Health System Performance (H1a)	0.21*	2.340	0.023	0.389
Communication Skills -> Health System Performance (H1b)	0.27**	4.431	0.145	0.372
Technical Skills -> Health System Performance (H1c)	0.40**	5.910	0.272	0.546
Functional Skills -> Co-production (H2a)	0.36**	4.239	0.184	0.521
Communication Skills -> Co-production (H2b)	0.31**	4.499	0.168	0.439
Technical Skills -> Co-production (H2c)	0.27*	3.041	0.087	0.428
Functional Skills -> Workflow Efficiency (H3a)	0.40**	4.867	0.228	0.561
Communication Skills -> Workflow Efficiency (H3b)	0.37**	5.696	0.237	0.486
Technical Skills -> Workflow Efficiency (H3c)	0.20*	2.915	0.070	0.322

Haddad (2017) also found that functional competencies (task-related skills) and managerial competencies (communication skills etc.) increase employee performance.

5. Discussion and Conclusion

The FS and TS of the Frontline employees, the first line users of e-HMIS, directly enhance the CP of healthcare services and WE of the employees. It is because better FS improves the efficacy of the employees to participate as active stakeholders in the CP process of the healthcare system and efficiently perform workplace tasks. Similarly, as the technology-based system of e-HMIS needs a skill set of technical abilities to operate such a system, the Frontline employees having TS can better use and utilize the computerized system. They can participate in the value co-creation and CP process of the digitalized medical record system by providing feedback about the advantages and disadvantages of the prevailing system. The e-literacy of the Frontline employees in the form of TS can enhance their WE through agility, effectiveness, and efficient work management. This is why TS has a direct positive association with e-HMIS-driven overall healthcare system performance. Studies indicate that the technical literacy and competency of e-HMIS users is a crucial factors for the better performance of this technology-based system (Heeks, 2006). Similarly, the person-job fit theory also highlights the importance of employee skills for achieving better performance.

Thus, better CS can enhance their functional and task performance ability through direct feedback and interaction with health services clients, which in turn help them in CP of healthcare services. Similarly, this positive impact of CS on FS of employees also enhances WE because they are better able to understand and perform the tasks according to the healthcare service consumers' needs. Technology is the need of time. The new age of the digital world has integrated technological aspects in every field of life, and it is crucial to follow the trends by allowing a change in the traditional system. The healthcare sector works as the backbone of the public services structure in any economy. Better health is the citizens' fundamental right, which is directly dependent upon a better and more efficient healthcare sector that meets the needs of people cost-effectively.

Government and private institutions should arrange training and education programs to enhance the functional, communication and technical abilities of the Frontline employees to achieve the benefits of e-HMIS through co-productivity and operational efficiency. Frontline employees are the doors for all the inputs by service seekers. They are also the first and foremost users of e-HMIS because they initiate the record entries in the system. Increasing these employees' literacy and competency level can enhance the WE and stakeholders' participation in the CP process, strengthening e-HMIS performance. The study model can be applied to design Frontline employee’s skill-building training programs through public and private collaboration. Improving workers' skills can enhance their job satisfaction and bring performance benefits.

The theoretical contributions of the paper include empirical evidence in the context of technology and healthcare services and e-healthcare system literature. It provides insights into the antecedents of e-healthcare system performance through a quantitative study. Secondly, the article extends the research about Frontline employees and their required basic skills in the emerging domain of e-healthcare system application. Thirdly, the literature about CP and WE is also enhanced by studying their role as factor of e-HMIS performance. Moreover, the CP process is emphasized by studying the less researched role of Frontline employees as a stakeholder in service sector performance.

Acknowledgment

This research is sponsored by the "**Higher Education Commission**" under project No. 9577/Punjab/NRPU/R&D/HEC/2017 titled as "*A step towards smart hospitals: Sustainable health information system from big data perspective*"

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