

Employee Satisfaction and Electronic Workflow in Healthcare Organizations

Mahmoud Salameh Qandeel

University of Pécs

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THE AIM OF THE PAPER

This study conducts a descriptive analysis to evaluate the perceived electronic workflow and satisfaction of staff members in a healthcare setting; furthermore, it analyzes whether the staff members are satisfied with the five facets of this electronic system.

METHODOLOGY

Following the evaluation, a questionnaire was piloted with a small group of healthcare employees. The study subsequently studied the five aspects of “electronic workflow”—electronic “work”, “transfer”, “audit and control”, „delay or postponement”, and „save and store” – in more detail by first conducting a descriptive analysis and then running a stepwise regression analysis.

MOST IMPORTANT RESULTS

Descriptively, employees demonstrated a positive perception of the electronic workflow, with consistently high estimations across various aspects, which reflects the system’s effectiveness in facilitating work processes and meeting staff expectations. In the regression, electronic (work, “delay or postponement”, “audit and control”, and “save and store”) were substantial predictors of employee satisfaction, but electronic transfer was not.

RECOMMENDATIONS

The study emphasized the significance of electronic systems in facilitating work, enhancing staff satisfaction, and improving receiving services. Notably, organizations must continuously optimize electronic processes by employing recent technologies to embrace developments.

Keywords: Electronic Workflow, Employee Satisfaction

INTRODUCTION

Technological innovations have transformed healthcare workflows by enhancing efficiency, data privacy, and decision-making (Paul et al. 2021), making electronic systems essential to healthcare operations. These efficient systems reduce errors and improve healthcare providers' satisfaction, which is reflected in the quality of service delivered (Zayas-Cabán et al. 2021). Implementing electronic systems changes the dynamics of workflow processes related to task execution, transfer, auditing, and control (Kammer et al. 2000; Ruecker 2021). Such systems, like the Hakeem system, integrate with existing workflows in many healthcare organizations, functioning independently from the broader public healthcare sector. These initiatives in healthcare settings have resulted in novel process workflows, where staff tasks including performing duties, transferring them, "controlling and auditing", and "saving and restoring" tasks – and the time to save and restore these duties, have changed (Qandeel et al. 2021). Despite millennials' infatuation with efficiency, new technology still faces significant challenges, including dissatisfied users (Myers and Sadaghiani 2010; Simon 2006). Regardless of their advantages, adopting technological developments can adversely affect workplace behavior (Griffiths et al. 2007). Significantly, systems in healthcare operations are not constrained to a mouse and keyboard; for instance, hospitals today utilize computerized voice assistants to enhance communication between patients and healthcare employees. Hence, system features that are more functional in process workflow and easy to use add both satisfaction and efficiency (Wilder et al. 2019).

Employee satisfaction is an essential indicator of performance and profits. It builds trust between co-workers and their supervisors and commitment to the job and the organization, reducing the opportunity for absenteeism, tardiness, and turnover, which, by nature, reflect on the organization's health and safety (Robbins and Judge 2013.). Assessing workflows' impact on satisfaction improves hospital efficiency. Electronic workflow may impact workers' well-being, as literature proves; for example, electronic monitoring might minimize job satisfaction and increase stress (Siegel et al. 2022). This satisfaction impacts the quality of treatment delivered, and investigating the effect of electronic workflow on personnel reveals consequences for patients' conditions. By conducting this inquiry, hospitals and other organizations implementing new systems can gather data that will help them guide their digital transition initiatives, boost employee satisfaction and productivity, and raise service quality

(Alolayyan et al. 2023). This study uses descriptive and stepwise regression analysis to examine how parts of electronic workflows – work, transfer, "audit and control", "delay or postponement," and "save and store" – affect employee satisfaction in healthcare environments. Analyzing data from a specialized facility, the study provides a broad perspective on the efficiency of workflows and their impact on employee satisfaction in similar organizations; it also lays the groundwork for future research on how digital workflows affect employee satisfaction in other fields.

STUDY OBJECTIVES

Measure employees' perception (low, medium, or high) of electronic workflow processes with the utilized system in a specialized healthcare setting and their associated satisfaction levels.

Evaluate whether the five electronic workflow factors in this healthcare setting – work, transfer, "audit and control", "delay or postponement", and "save and store" – impact employee satisfaction.

THEORETICAL BACKGROUND

The current study assesses employee satisfaction in a healthcare facility transitioning to a new digitalization system. This research is important, as measuring and communicating change outcomes can motivate staff (Filep 2024). Based on sociotechnical systems theory (Trist and Bamforth 1951) and the job demands-resources model (Bakker and Demerouti 2007), the study claims that previous research has not properly investigated how different parts of digital workflows connect. Inefficiencies in auditing or transferring tasks can reduce satisfaction, but studies usually focus on separate issues like efficiency (Almalki et al. 2023) or autonomy (Lorentzon et al. 2023). A unified framework that connects work, task transfer, auditing, delays, and storage to overall satisfaction is currently lacking. While previous research has explored digital systems, such as remote work, few studies have specifically examined the impacts of workflows on satisfaction. Studies on organizational change (Poór 2019), home-office setups (Venczel-Szakó és tsai 2023), and project management (Szigeti and Hornyák 2024) overlook these dimensions, as does Bányai's (2019) study, which neglects the role of satisfaction in transitions. The following subsections analyze electronic workflow dimensions – work, transfer, audit/control, delays, and save/store – and their ties to satisfaction.

Digital *transmission* significantly alters workflow, influencing the *nature of work* and its

transfer across departments. In Ghana, e-health for tasks like registration/communication boosted satisfaction (Atinga et al. 2020). Digital systems streamline HR tasks, improving accuracy and accessibility (Al Shobaki et al. 2017). Automation improves precision in tasks like medical documentation (Kostrzewa et al. 2022). Computerized records in hospitals have streamlined the appointment reservation process, demonstrating effectiveness within three minutes (Seiger et al. 2018). Atinga et al. (2020) associate electronic communication with higher satisfaction; however, they do not distinguish how various workflow phases, such as „transfer” and „work execution,” may contribute separately to this satisfaction. The present study addresses this issue.

Effective digital *control* and *auditing* improve efficiency, influencing satisfaction and autonomy. In Yemen, implementing digital systems improved audit efficiency, especially when personnel had the requisite skills and management provided robust support for the transition. Executives and personnel indicated increased satisfaction with the digital audit process (Almotawkel and Qureshi 2021). In Sri Lanka, modern audit tools have also improved the quality of audits and employee satisfaction (Fernando and Pradeep Kumara 2023). Lorentzon et al. (2023) showed that innovative tools improve audit quality, autonomy, and work-life balance. Technology-driven autonomy boosts morale and productivity (Marshall and Lambert 2018). Financial controls (e.g., role-based access) streamline audits and accessibility controls on accounts, assisting auditors in evaluating risks and controls. Auditing technology adoption, considering users’ perspectives, improves operational efficiency, satisfaction, and work-life balance.

Existing literature rarely categorizes *electronic delays* as distinct workflow dimensions. In the USA, poor electronic health record design increased doctor fatigue and delayed medication workflows, but interface improvements restored efficiency

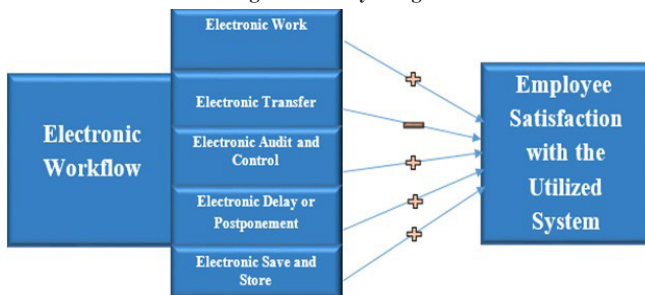
and usability (Prather 2019). New tools have streamlined healthcare procedures, enabling faster outcomes for staff and patients alike (Patzner et al. 2018). New systems cut prescription delivery times by 83% (Almalki et al. 2023). This upgrade positively impacted costs, inventory management, and staff satisfaction. The effectiveness of the designed technologies in minimizing delays ultimately depends on their ability to address workflow interruptions and meet user expectations.

E-systems streamline workflows through data management. For example, e-consent forms cut costs and accelerate *retrieval*. These electronic forms increase the reliability and allow for faster responses from staff (Chhin et al. 2017). Still, systems might face technical difficulties. Resilience features like secure *backup* and *recovery* mitigate dissatisfaction from disruptions (Van Der Vegt et al. 2015). Munsiff et al. (2024) describe a USA hospital that integrated treatment monitoring and reporting into one digital system, improving communication and satisfaction. Soonthodu and Shetty (2021) demonstrated that simplified digital storage systems increased transparency, reduced errors, and enhanced overall satisfaction. They valued the opportunity to contribute to and update these integrated systems. The current study proposes that these systems boost transparency and accessibility, yet their effectiveness relies on responsiveness and streamlined integration into daily workflows.

METHODOLOGY

This study explores employee perspectives on electronic workflow through descriptive analysis and stepwise regression. Figure 1. depicts five electronic workflows: work, transfer, “audit and control”, “delay or postponement”, and “save and store”. Additionally, the dependent variable, “employee satisfaction” was evaluated.

Figure 1. Study design



Source: Author's elaboration

This study was conducted at King Hussein Cancer Center (KHCC), a major specialized oncology facility in Jordan. Data were collected via a structured questionnaire (Appendix 1.). The questionnaire included six items per workflow dimension (work, transfer, audit/control, delay/postponement, save/store) and six satisfaction items. It uses a five-point Likert scale to rank the items; five represents „strongly agree”, and one is „strongly disagree”. 36 items were designed to assess staff opinions on *digital processes and their satisfaction* level. From approximately 2,500 system users at KHCC, a stratified random sample of 250 employees was selected to ensure proportional representation across various occupational groups. Thus, three strata were identified: nurses (40%), administrative staff (40%), and other medical professionals (e.g., pharmacists, radiologists) (20%). Within each stratum, random sampling was conducted until reaching the desired ratios. Remarkably, 50.8% of the total sample were males, and 88.4% were 36 years old or below. Due to recent institutional expansion, 71.6% of the sample had experience within the last 5 years or less. In addition, 77.2% of the employees had bachelor’s degrees; the others were diploma, master’s, or doctorate holders.

Questionnaires were manually distributed and self-administered. Participants received both oral and written explanations regarding the study’s purpose, the voluntary nature of participation, and confidentiality. Items were upright to minimize biases (e.g., social desirability) and were completed at participants’ own pace. Likert-scale responses were categorized as low/medium/high for descriptive analysis. A pilot study assessed validity and reliability (see next section). Each workflow dimension was an independent variable; satisfaction was the dependent variable. Mean scores per dimension were calculated for descriptive statistics and stepwise regression to identify significant predictors of satisfaction.

DATA ANALYSIS

Pilot study

30 employees from three strata (10 each) – nurses, administrative staff, and other medical staff – were tested. Pearson correlations between items and

their dimensions ranged from 0.596 to 0.937 ($\alpha \leq 0.01$). Cronbach’s alpha ranged from 0.89 to 0.97, exceeding the 0.70 threshold (Tavakol and Dennick 2011). No multicollinearity was detected (VIF: 1.987–2.898; Tolerance: 0.345–0.503).

Descriptive analysis of the electronic workflow variables and employee satisfaction

Table 1. summarizes the five workflow dimensions and satisfaction (means, SDs, and low/medium/high estimation). Appendix 1. provides full details.

Electronic work. Mean: 3.96 (high estimation); item means ranged from 3.88 to 4.00. The highest mean was “Using the electronic system is more useful in my work”, and the lowest was “The electronic system enables me to accomplish the required functional tasks quickly”.

Electronic transfer. Mean: 4.06 (high); item means 3.90–4.17. Highest: The electronic system helps to respond to the transferred information in a short time (4.17); lowest: “The required functional skills to transfer the electronic work are not a hard thing” (3.90).

Electronic audit and control. Item means 3.84–4.18 (high). Highest: The electronic system speeds up auditing and controlling (4.18); lowest: Data and information are highly secured due to the use of electronic auditing and controlling (3.84). Total mean: 4.06.

Electronic delay or postponement. Item means: 3.47–4.10 (medium/high). Highest: The electronic system helps to have the information accurately and clearly (4.10); lowest: Using the electronic system prevents any delay or postponement of work (3.47).

Electronic save and store. Mean: 4.12; item means 3.89–4.24 (high). Highest: Saving and storing by using the electronic system has become easier (4.24); lowest: No hazard when saving and storing information (3.89).

Employee satisfaction. Satisfaction mean: 3.77 (high); item means 3.62–3.99 (medium/high). Highest: Utilizing this facility’s electronic system, in my opinion, is the correct course of action (3.99); lowest: The embedded system in use has my satisfaction (3.62).

Table 1. Dimensions of the electronic workflow and employee satisfaction

Dimension	Mean	SD	Degree
Electronic workflow			
1. Electronic work	3.96	.768	High
2. Electronic transfer	4.06	.667	High
3. Electronic audit and control	4.06	.647	High
4. Electronic delay or postponement	3.89	.732	High
5. Electronic save and store	4.12	.657	High
Employee satisfaction	3.77	.786	High

**The mean was measured on a 1–5 scale, divided by 3 to give low, medium, and high estimations.*

Source: Author's elaboration

Stepwise multiple regression of the electronic process workflow variables and their relationship with employee satisfaction

The study conducted a stepwise regression using cumulative measures to predict employee satisfaction. Table 2. presents the sequence in which variables were included in the regression model. A unit increase in satisfaction was predicted by the „electronic workflow” variables as follows:

49.7% „electronic work” + 54.7 % „electronic delay or postponement” + 56.3% „electronic audit and control” + 57.1 % „electronic save and store”. In contrast, the „electronic transfer” aspect was not significant at 0.05 and was therefore excluded from the equation. All other variables are significant (Table 2.). The correlation coefficient ($R = 0.755$) indicated a strong relationship, but the R^2 change proposed limited additional predictive power; however, the model remained significant ($F [4.285, 1] < 0.05$).

Table 2. Stepwise multiple regression test

Stepwise Multiple Regression	R	R Square	Change Statistics				
			R Square Change	F Change	df1	df2	Sig.
1- Electronic work	.705	.497	.497	244.591	1	248	$\alpha \leq .01$
2- Electronic delay or postponement	.740	.547	.051	27.773	1	247	$\alpha \leq .01$
3- Electronic audit and control	.750	.563	.016	8.804	1	246	.003
4- Electronic save and store	.755	.571	.008	4.285	1	245	.039
5- Electronic transfer was excluded, where t-statistics was (-0.560) and α (0.576).							

(α is significant at ≤ 0.05 .) Dependent variable: Employee Satisfaction. Independent variable: Electronic workflow variables.

Source: Author's elaboration

Results and discussion

This study aimed to clarify how process workflows function within the electronic systems utilized by organizations, particularly in healthcare facilities, and to examine their impact on employee satisfaction. The research identified five distinct components of the process workflow: electronic work, electronic transfer, electronic delay or postponement, electronic audit and control, and electronic save and store. A descriptive analysis was performed on the survey data to identify attitudes as either low, medium, or high. With high estimations observed, employees had a positive perspective toward the electronic workflow. Employees at the

studied healthcare institution observe it as a useful instrument for their daily duties.

The descriptive analysis outlines the first research objective. Thus, the results of this analysis are in line with the literature on desirable changes in process workflow, including improvements in task performance, task transfer, reduced delays or postponements, enhanced audits and controls, instant data saving and storage, and a positive perception regarding the implemented system. For instance, Atinga et al. (2020) showed that technological innovation adoption enhances electronic health sector activities such as communication, registration, and consultation. Hanauer et al. (2017) explained that the adoption of technological innovations facilitates the transformation of information. Similarly,

Al Shobaki et al. (2017) claimed that utilizing a digital system provides accurate and conveniently available information and decision-making accuracy. However, research by Almotawkel and Qureshi (2021) discovered that these technologies enhance auditing and control procedures. Patzer et al. (2018) explained that patients can begin receiving treatment promptly, preventing delays and preserving staff time. Further, Soonthodu and Shetty (2021) demonstrated that these systems render data storage and retrieval faster, increasing transparency, reducing errors, and providing immediate access to information. All five characteristics of electronic workflow promote favorable evaluations from staff; nevertheless, stepwise regression determines the exact relationship between these aspects and employee satisfaction.

Regarding the second research objective, stepwise regression analysis reveals a link between electronic workflow elements and employee satisfaction. The variables of electronic process workflow (work, “delay or postponement”, “audit and control”, and “save and store”) are significant predictors of employee satisfaction. In contrast, electronic transfer showed no considerable influence on staff perspectives. The impact of *electronic transfer* on employee satisfaction is not in line with the studies of Atinga et al. (2020), Hanauer et al. (2017), and Liddy et al. (2019). This study attributes this disparity to a disconnect between digital transfers and task completion. Tasks transferred in real life might still rely on physical resources, such as sample availability, imaging procedures, direct patient interaction, or personal knowledge and intervention, causing delays that diminish perceived usefulness. Additionally, a high volume of transferred orders might lead to workflow congestion instead of providing relief. Although the system operates properly, staff might not feel its benefits, explaining why electronic transfer did not significantly predict satisfaction. Significantly, the study aligns with previous studies concerning the impact of different facets of electronic process workflow on employee satisfaction. For instance, Ho et al. (2019) and Seiger et al. (2018) indicated that employees’ perceptions of electronic work, including ease and automatic command fluidity, impact staff satisfaction. Lorentzon et al. (2023) demonstrated enhanced control processes, auditing rapidity and quality, and a boost in staff feelings and capabilities. Almalki et al. (2023) revealed that the time between orders and delivery dropped. Likewise, Chhin et al. (2017) reported that electronic systems support faster data saving and retrieval, which promotes instant staff interaction and boosts satisfaction.

CONCLUSIONS

This study examined staff impressions of the electronic workflow and satisfaction with the system at a specialized healthcare facility and analyzed the impact of each electronic workflow aspect on employee satisfaction. Accordingly, the descriptive analysis revealed that employees at the healthcare facility had a positive perception of the electronic workflow, with high estimates observed across several facets of the system. Additionally, employee satisfaction with the electronic system demonstrated its efficacy in facilitating work processes and meeting their demands. Meanwhile, stepwise regression analysis demonstrated substantial predictors of employee satisfaction involving electronic work, “delay or postponement”, “audit and control”, and “save and store”, whereas electronic transfer did not exhibit any noteworthy effect on satisfaction.

This study *contributes* to the literature by examining multiple facets of electronic workflow and their impact on satisfaction, thereby adding knowledge to healthcare management and information systems areas and demonstrating the importance of continuing adaptation to innovative technologies. Furthermore, these technologies simplify the traditional management workflow into a faster and more efficient task execution process, reshaping the organization’s structure by eliminating long communication channels and positively influencing staff attitudes and work quality.

Understanding workers’ perspectives on electronic workflow aids in developing current technologies that meet requirements and improve the efficiency of process workflows. Additionally, understanding variables influencing satisfaction may influence strategic decision-making regarding using or developing electronic systems in the managerial field. This study assessed the link between two variables at a single healthcare institution based on a self-reported questionnaire. However, positive findings may not fully represent overall satisfaction at this institution, which is acknowledged as a limitation.

Considering the non-significance of electronic transfer in this study, further research may be necessary to explore the electronic process workflow in other organizations. Additionally, it is important to investigate other potential factors and their impacts on employee satisfaction, including leadership styles, organizational injustices, and work characteristics that could influence both employee happiness and the organization’s reputation.

PRACTICAL RECOMMENDATIONS

The current study indicates that electronic workflows – such as electronic work, audit and control, delay management, and task saving – positively impact employee satisfaction. It also suggests that successful implementation in other organizations can be achieved by considering practical factors: (1) *involving staff* in the early diagnostics of the applied system to inform process design based on achievable utility, (2) providing functional training customized to daily tasks of each role, and (3) establishing constant internal communication channels to directly identify and address emerging issues and bottlenecks during implementation. However, despite the electronic transfer factor receiving a high average rating, it did not correlate with satisfaction, which might be attributable to practical obstacles that involve data overload and reliance on the in-person presence of certain resources (e.g., humans or materials being used in line with the system), causing delays in subsequent processes.

That said, the study indicates that technological efficacy alone is an inadequate indicator of success; satisfaction depends on the extent to which systems simplify the achievement of practical workflows. When adopting a new system, the focus should be on creating an effective design that minimizes task repetition, waiting times, and administrative expenses. From a managerial perspective, pursuing continuous system adjustment, guided by staff-reported challenges, will control resistance and discouragement. Significantly, transitioning to electronic workflows should lead to changes in organizational culture, not merely improvements in IT. This process encompasses the new system's workflows, leadership strategies associated with the adopted system, and the establishment of specific related objectives such as user engagement and the measurement of success, reliability, and employee sentiment. Therefore, the above approaches, centered on achievable and results-oriented measures, present a more applicable model than vague technological promises and offer applicable solutions for other organizations adopting digitalization, as demonstrated by the KHCC healthcare facility sample.

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Ethics approval and consent to participate

This study is part of a research investigation and was approved by the King Hussein Cancer Center's Institutional Review Board (IRB) (19 KHCC 126). All methods of this study were performed per the relevant guidelines and regulations of the ethical committee of the KHCC. Informed consent was obtained from all the participants.

Availability of data and materials

All data generated and analyzed during this research is included in it. This paper has not been published anyway, but it is still preprinted at Research Square: <https://doi.org/10.21203/rs.3.rs-2338904/v1>.

Appendix 1. Description of the electronic workflow and employee satisfaction variables

Paragraph Number	Item	Mean	SD	Rank	Degree
1	It is easy to learn to do work efficiently based on the electronic system.	3.92	.800	5	High
2	Using the electronic system is more useful in my work.	4.00	1.000	1	High
3	The electronic system enables me to accomplish the required functional tasks quickly.	3.88	1.055	6	High
4	The electronic system enables me to accomplish the required functional tasks easily.	3.96	.924	4	High
5	My interaction with the electronic system regarding work is clear and understandable.	3.99	.799	2	High
6	Must be using the electronic system to do work.	3.98	.980	3	High
#	Electronic Work	3.96	.768		High
1	The electronic system helps to transfer work quickly and effectively.	4.11	.905	3	High
2	The required functional skills to transfer electronic work are not challenging.	3.90	.827	6	High
3	It is easy to learn to transfer work based on the electronic system.	3.94	.848	5	High
4	The electronic system helps me to obtain the required information in time.	4.16	.804	2	High
5	The electronic system helps to respond to the transferred information in a brief time.	4.17	.825	1	High
6	The electronic system helps quickly download information.	4.08	.842	4	High
#	Electronic Transfer	4.06	.667		High
1	Doing auditing and controlling by using the electronic system has become more efficient.	4.14	.855	3	High
2	The electronic system facilitates auditing and controlling.	4.15	.797	2	High
3	The electronic system speeds up auditing and controlling.	4.18	.719	1	High
4	Risks related to privacy and confidentiality are reduced with electronic auditing and controlling.	3.99	.809	5	High
5	The work becomes more perfect with electronic auditing and controlling.	4.07	.826	4	High
6	Data and information are highly secured due to the use of electronic auditing and controlling.	3.84	.856	6	High
#	Electronic Audit and Control	4.06	.647		High
1	Using the electronic system prevents any delay or postponement of work.	3.47	1.026	6	Medium
2	The electronic system helps to accomplish work more easily.	3.89	.970	4	High
3	The electronic system helps me to accomplish work more quickly.	3.87	.977	5	High
4	The electronic system helps to accomplish work more efficiently and effectively.	3.97	.924	3	High
5	The electronic system helps to have the information accurately and clearly.	4.10	.775	1	High
6	All the information I need is available on the electronic system.	4.01	.864	2	High
#	Electronic Delay or Postponement	3.89	.732		High

1	Saving and storing data by using an electronic system is more efficient and effective.	4.16	.816	3	High
2	Saving and storing by using the electronic system has become easier.	4.24	.754	1	High
3	The electronic system helps save and store accomplished tasks quickly.	4.20	.730	2	High
4	The required skills to do saving and store are not hard things.	4.16	.743	3	High
5	The electronic system ensures the security and confidentiality of stored information.	4.06	.800	4	High
6	No hazard when saving and storing information.	3.89	.925	5	High
#	Electronic Save and Store	4.12	.657		High
1	The embedded system in use has my satisfaction.	3.62	1.046	6	Medium
2	I trust the security and privacy of the electronic system whenever I use it.	3.86	.850	2	High
3	A high-quality standard is provided by the electronic system.	3.67	.968	5	Medium
4	Utilizing this facility's electronic system, in my opinion, is the correct course of action.	3.99	.910	1	High
5	I am pleased with how accurate the work produced by the electronic system is.	3.74	.964	3	High
6	I am pleased with how quickly the electronic system responded to the task needed.	3.72	.971	4	High
#	Employee Satisfaction	3.77	.786		High

(α is significant at ≤ 0.05 .) Dependent variable: Employee Satisfaction, Independent variable: Electronic Workflow variables.

Source: Author's elaboration