VOLUME 36, NUMBER 2

April-June 2020

Article
Page 2

References
Page 13

Authors

Dr. Shweta Chopra
Department of Engineering Technology and Management, Ohio University

Jayaruwani Fernando
Agricultural Engineering and Soil Science Department at the Rajarata University of Sri Lanka

ATMAE
701 Exposition Place
Suite 206
Raleigh, NC 27615

www. atmae.org

JTMAE
The Journal of Technology, Management, and Applied Engineering

Modeling Employees Behavior Intention with the Adoption of a Suggestion System for Lean Initiatives

Keywords:
Behavioral Intention, Healthcare, Lean Principles, Employee Suggestion System

SUBMITTED FOR *PEER – REFEREED*

Modeling Employees Behavior Intention with the Adoption of a Suggestion System for Lean Initiatives

Dr. Shweta Chopra is an assistant professor in Engineering Technology and Management Department at Ohio University (OU). Prior to this she was an Assistant professor at Iowa State University. She has Ph.D. in Industrial Technology from College of Technology, Purdue University, Masters of Material Science and Engineering from Rochester Institute of Technology and Bachelors in Polymer Engineering from Pune University. Her research areas are lean manufacturing for small and medium organization, healthcare; use of Information and communication technology for food distribution, examining racial discrimination in higher education, and measuring student learning outcome with industry engagement. She teach courses related to design, capstone and operation management.

ABSTRACT

The cost of healthcare in the United States is increasing at a significant rate. A substantial portion of the increased costs is associated to non-value-added activities in healthcare. For the past two decades, the healthcare industry has employed lean principles to increase quality and safety measures while reducing costs. Lean initiatives require extensive employee participation. Capturing employee suggestions is one way to engage employees in the improvement process. The purpose of this paper is to understand factors impacting employee behavioral intentions towards using an employee suggestion system (ESS) called KaiNexus, to facilitate process improvement in a healthcare organization. For this purpose, data were collected using a questionnaire-based survey distributed among the employees of Mary Greely Medical Center (MGMC). SmartPLS software was used to analyze the collected data. Results show that performance expectancy and social influence exerted a significant positive influence on employee behavioral intentions to use KaiNexus. The variables, effort expectancy and facilitating conditions, on the other hand, did not have a significant impact on employee behavioral intentions. Findings from this research will help organizations re-evaluate factors that increase employee participation in process improvement. An employee suggestion system offers a platform for employees and managers to work collaboratively on suggestions and reduce non-value-added activities in the daily operational process.

INTRODUCTION

The United States (US) is the highest spender on healthcare in the world; over 17% of the US gross domestic product (GDP) was devoted to healthcare in 2013. Notably, healthcare expenditure within the United States is 50% greater than the next-highest spender, France (11.6% of GDP), and two times more than healthcare spending in the United Kingdom (8.8% of GDP) (Squires & Anderson, 2015). One of the challenges faced by the American healthcare sector is finding methods to reduce medical errors while increasing quality and maintaining costs. Indeed, in 2010 the Patient Protection and Affordable Care Act increases pressure on healthcare providers to reduce costs related to healthcare services while improving quality. Consistency with which individual patients obtain desirable health outcomes with their existing professional knowledge helps measure healthcare quality (Sanfilippo, Bieber, Javitch, & Siegrist, 2015). Markedly, inefficiencies in the care system, not just the higher cost of medical care, contribute significantly to the overall healthcare cost.

The past decade saw the implementation of lean practices beyond the realm of manufacturing. In the healthcare sector, lean methodology is aimed at providing quality care at low costs (Graban, 2011). Specifically, lean principles in healthcare focus on providing quality care, increasing systems efficiency, reducing errors in the process, and making healthcare affordable. Systems efficiency is enhanced when the people using the system are motivated to work collectively towards the common goal of process improvement. Thus, lean principles in healthcare increase employee responsibility towards continuous professional improvement (Simons et al., 2017) in terms of daily responsibilities. Currently, employees participate in resolving problems without considering waste reduction as a part of their work (Manos, Sattler, & Alukal, 2006). Unnecessary procedures or bottlenecks in service processes are opportunities to facilitate improvements (Mann, 2014). Because of their familiarity with organizational procedures, employees are in the best position to suggest improvements to job activities for organizational advancement (Lindberg & Rosenqvist, 2005). In the healthcare sector, employee involvement can be enhanced by utilizing the lean management system.

The lean management system is a continuous process improvement methodology that consists of multiple process improvement systems (Graban, 2011). A suggestion management system helps improve

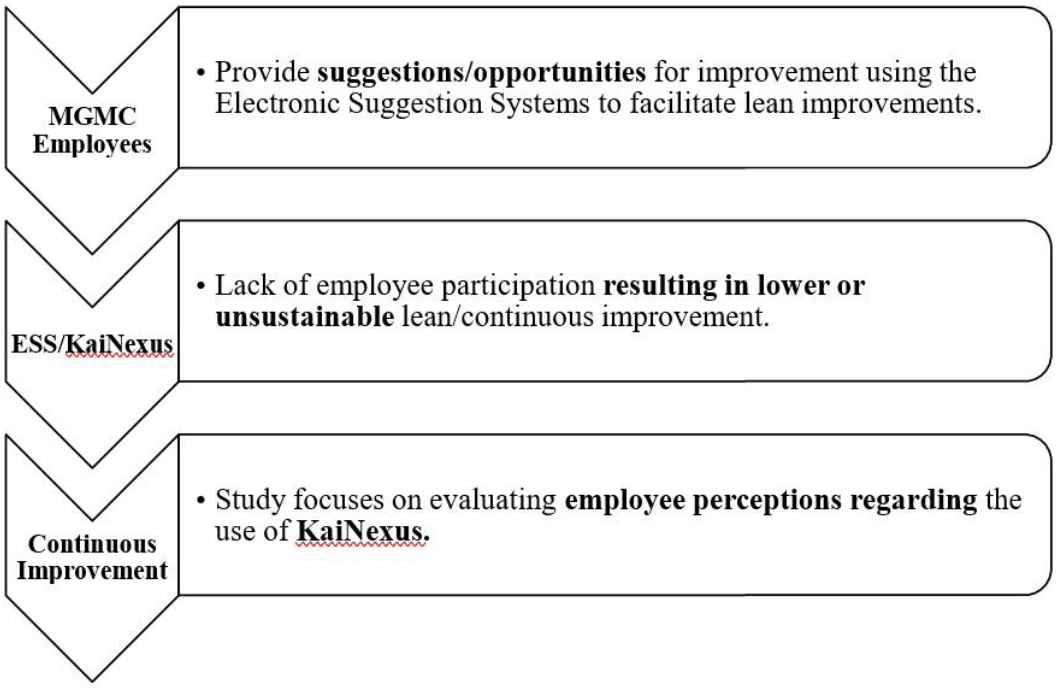
Jayaruwani Fernando is a senior lecturer in Agricultural Engineering and Soil Science Department at the Rajarata University of Sri Lanka. She has M.S. in Industrial and Agricultural Technology from Iowa State University, U.S.A, M.Phil. in Agricultural and Biosystems Engineering from the University of Peradeniya, and B.Sc. in Agriculture from the Rajarata University of Sri Lanka. Her research areas are; food process engineering: application of novel drying methods for agricultural products, physical and engineering properties of foods, and how these properties change with industrially prevailing processing conditions; and lean manufacturing for small and medium organizations.

organizational performance by focusing employees on continuous improvement through teamwork and facilitating the use of an employee suggestion system (ESS) (Fairbank, Spangler, & Williams, 2003). KaiNexus is an ESS used in the healthcare sector to capture employee feedback supporting process improvement. In this paper, we use the terms ESS and KaiNexus interchangeably (KaiNexus.com, 2016). It helps to facilitate process improvements by providing a platform to implement employee suggestions.

The daily improvement program at Mary Greeley Medical Center (MGMC), Ames, Iowa, uses the KaiNexus platform. Before KaiNexus, traditional suggestion boxes (paper-based lock-and-key systems) were used. This traditional method lacked transparency and failed to foster collaboration in addressing challenges. MGMC employees felt a lack of control over the suggestion system thus, impeding the hospital's ability to capture and implement the best ideas for improvement. To promote collaboration, transparency, and faster responses to employee suggestions, MGMC decided to adopt an electronic suggestion system—KaiNexus. Departments that utilized KaiNexus frequently saw significantly higher levels of improvement as employees felt heard. Employees were further encouraged to voice their suggestions as they received updates regarding the progress and impact of their feedback resulting in process improvement. Thus, KaiNexus played a key role in enabling a culture of continuous improvement at MGMC.

MGMC used KaiNexus to gather employee suggestions and develop collaborative teams to address specific recommendations and resolve issues. MGMC also used KaiNexus to recognize employees' efforts. However, not all the employees were using the system to voice their opinions, so it was in MGMC's interest to capture the missing voices to further enhance workplace efficiency. The purpose of this study was to systematically evaluate employee intentions towards the use of KaiNexus and identify key recommendations for research and practice on the use of ESS in healthcare. Figure 1 describes the research outline of the study.

Figure 1. The research outline of the study



THEORETICAL BACKGROUND

This section aims at understanding the role technology plays in enabling process improvements in healthcare organizations. Process improvement is vital to building a culture of continuous improvement within the healthcare industry. In the current study, we evaluate how process improvement drives continuous improvement and facilitates the integration of lean culture. At MGMC this culture was created by

soliciting and gathering employee suggestions concerning potential improvements in the workplace/ work processes. KaiNexus/ESS provided the platform for employees to document their recommendations for improvement. The focus of this paper is to understand the behavioral intentions of employees to facilitate the adoption of KaiNexus.

Process Improvements in Healthcare

The employment of lean management is one method of increasing quality while reducing costs in healthcare (Garban, 2011). The lean management process, which relies on the continuous improvement philosophy (Mann, 2014), manifests changes by increasing value for customers through reduction in non- value-added activities, improving the quality of work, and minimizing process variations. Reduced lead- time, reduced rework, increased financial savings, increased process understanding, and reduced inventory are other benefits of the lean approach in healthcare (Simons et al., 2017). Unnecessary organizational processes (wastes) provide opportunities to facilitate improvements (Graban, 2011; Mann, 2014).

Squandered human potential is one of the significant wastes defined by the lean approach and occurs when employee engagement towards process improvement is disregarded (Graban, 2011). Because of employee familiarity with day-to-day operations, they are well-placed to work with others to improve job activities for organizational advancement (Manos, Sattler, & Alukal, 2006). A suggestion system helps to improve organizational performance by focusing on the continuous improvement of employees through teamwork (Zejnilovic, Oliveira, & Veloso, 2012).

An effective ESS takes the process further by helping employees in an organization track the progress of recommended suggestions (Fairbank et al., 2003). ESS is better than traditional suggestion boxes as the latter lack clarity, efficiency, and participation from employees in process improvement. Thus, ESS is increasingly being adopted by the management to improve functions and efficiency as the healthcare sector experiences rising competition (Graban, 2011). The use of ESS facilitates submission, evaluation, and implementation of employee ideas while simultaneously saving costs and improving quality (Garban, 2011). Therefore, the adoption of ESS is advantageous to both the organization and employees (Zejnilovic et al., 2012). The benefits for organizations include reduced costs, increased revenues, better-designed processes, improved quality, increased profits, improved communications, reduced employee resistance to change, and the implementation of best practices throughout the organization (Fairbank et al., 2003). ESS can also result in improved morale and cooperation among employees. Tangible rewards and non-monetary recognition can often drive employees to use the ESS system.

In recent years, ESS have become widely used tools in healthcare organizations for process improvements. KaiNexus is an example of ESS in the healthcare sector. KaiNexus is an operational improvement software platform which collects employee suggestions concerning process improvements. The employees submit their recommendations, and the software platform subsequently facilitates the implementation of submitted improvement ideas. When employee suggestions are submitted, KaiNexus provides active notifications to leaders while simultaneously developing collaborative teams to implement the suggestion. These collaborative teams engage in communication via the platform working on task completion to ensure employee suggestions are put into practice. Finally, KaiNexus acknowledges the employees involved in task completion. KaiNexus also measures the time and cost savings engendered by each suggestion (KaiNexus.com., 2016). However, the success of the KaiNexus platform depends on its users. Only when users log in and provide suggestions can KaiNexus function effectively.

Lack of employee participation can significantly impede process improvement by failing to shine the spotlight on potential process refinements or corrections. An effective ESS will provide benefits to the employees, management, and customers while increasing procedural safety and reducing associated costs.

The success of ESS depends on each employee taking the time to log in and participate. However, due to various reasons, individual employees may choose not to access the ESS platform. This research focuses on understanding barriers to the use of ESS systems among healthcare employees. For this study, a survey was distributed among MGMC staff who, at the time, had access to KaiNexus for over a year.

Research Model

Venkatesh, Morris, Davis, and Davis, (2003) proposed a unified model known as Unified Theory of Acceptance and Use of Technology (UTAUT), which is based on four core constructs that explain and predict user behavior toward new technology. UTAUT's four constructs include performance expectancy, effort expectancy, facilitating conditions, and social influence (Venkatesh et al., 2003).

Effort expectancy (EE) is defined as the amount of effort users expend to use the newly introduced technology. In the case of KaiNexus, effort expectancy is measured by the amount of effort an employee is willing to put into learning how to navigate the ESS and how user-friendly they find the ESS platform. Empirical research shows, effort expectancy is more salient in the early stages of new technology. The early stage is when significant changes are being made to the technology resulting in hurdles to overcome.

Performance expectancy (PE) is defined as the degree to which an individual believes that using technology will help improve their daily performance on the job (Venkatesh et al., 2003). This attribute reflects how useful technology is for day-to-day business processes. In terms of KaiNexus, performance expectancy represents the extent to which employees at MGMC believe that using this new system will enhance their productivity on a daily basis.

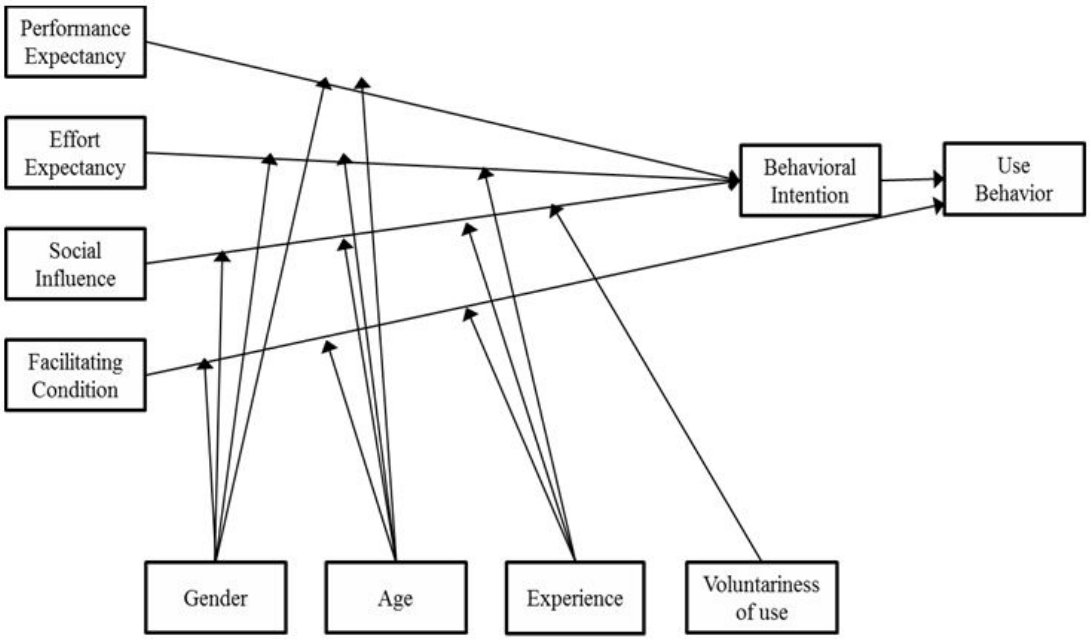
Social influence (SI) is defined as the degree to which an individual perceives an increase in the amount of respect garnered in the community (from friends, family, colleagues, and superiors) due to the use of the newly adopted technology. In the case of KaiNexus' adoption at MGMC, social influence was measured as the extent to which employees perceived feeling more valued by the organization, their colleagues, and superiors resulting from their use of the ESS.

Facilitating conditions (FC) is defined as the degree to which individuals believe they have access to support to navigate the system and rectify problems that occur (Venkatesh et al., 2003). In the case of KaiNexus, FC was measured by the degree of technical support provided to MGMC employees when they encountered issues while using the ESS.

The current study measures the proportion of variance in the behavior intention (BI) of an employee, which can be explained by the variables, PE, EE, SI, and FC. It can be hypothesized that all four antecedents will positively influence employee behavioral intentions with regards to the use of KaiNexus. Figure 2 depicts the UTAUT model. Below are listed hypothesis for the model testing.

- Performance expectancy will positively influence the behavior intentions of employees to use KaiNexus.
- Effort expectancy will positively influence the behavior intention of employees to use KaiNexus.
- Social influence will positively influence the behavior intention of the employees to use KaiNexus.
- Facilitating conditions will positively influence the behavior intention of the employees to use KaiNexus.

Figure 2. UTAUT research model (adapted from Venkatesh et al., 2003)



Justification for Employing the UTAUT Model for the Current Study

Several studies have been conducted to evaluate technology acceptance among healthcare employees by applying the constructs of the UTAUT model. This model is robust and integrates 32 predictor variables from the eight previous behavior models of technology acceptance into four factors which help predict intentions to use and usage (Chopra & Rajan, 2016). The UTAUT model is suitable for studying employee intentions towards the use of technology in both mandatory and voluntary settings. This model explains approximately 70% of the variance in behavioral intentions and provides exhaustive understanding as well as predictions of user intentions for using newly instituted technology (Venkatesh et al., 2003).

Prior studies in healthcare have also utilized the UTAUT model resulting in the achievement of relevant outcomes. Relevant prior studies are discussed in the next 2 paragraphs. A study on the acceptance of Information and Communication Technology (ICT) among occupational therapists found that effort expectancy and compatibility influenced occupational therapists' usage intentions of ICT (Schaper & Pervan, 2007). Performance expectancy, social influence, and facilitating conditions had a significant positive impact on the behavioral intentions surrounding the adoption of home healthcare robots (Alaiad & Zhou, 2014). Ifinedo (2012) found that usage behavior was significantly affected by effort expectancy, social influence, compatibility, and facilitating organizational conditions. Furthermore, he found that performance expectancy did not significantly influence technology acceptance.

Gagnon et al. (2014) studied the adoption of Electronic Health Records (EHR) among physicians and found, physicians' intentions to use the EHR was influenced by perceived ease of use, social norms, and professional norms. In a voluntary setting, Kijsanayotin, Pannarunothai, and Speedie (2009) found performance expectancy, effort expectancy, and social influence had a significant positive impact on the adoption of an information technology system in Thailand's community health centers. A study on healthcare professionals' adoption of mobile electronic medical records (EMR) found that healthcare professionals' intentions to use the mobile EMR system was affected by performance expectancy and attitude (Kim et al., 2016).

The current study measures user intentions towards accessing the KaiNexus platform. The UTAUT model is parsimonious in addition to being robust and rigorous, and significant past research in healthcare

has been conducted using this model. Thus, UTAUT was deemed a relevant model for the current study. Currently, there is lack of study which measures impact of employee's participation in lean improvement where employees use software to provide recommendation/suggestion for improvement. This study addresses the gap by evaluating a software platform which helps establish the relevance of continuous improvement in healthcare. Again, continuous improvement can cut down significant costs while increasing safety, employee morale, and productivity.

MGMC employees are given to understand that they have two jobs—their daily job and the job to find ways to improve their daily work. MGMC has a powerful management vision on continuous improvement; the KaiNexus platform is an essential tool which tracks and manages these improvements. In summary, KaiNexus provides a platform for employees to recommend suggestions for improvement. The UTAUT model provides a validated framework for assessing the challenges associated with the use of KaiNexus. Findings from this study will help identify barriers to the dissemination of the KaiNexus platform within MGMC and similar organizations. Addressing these barriers will lead to increased use of KaiNexus, which in turn will facilitate additional lean initiatives. These lean initiatives will potentially contribute to improved customer satisfaction, reduction in errors, and a decrease in the cost of care.

RESEARCH METHODOLOGY

Instrument Development

A questionnaire-based survey was used for data collection. Previously validated questionnaire items were adopted to develop the current study's survey. ESS was used as a catchall term for technology/software used by employees to provide suggestions, referred to as opportunities for improvement (OI) at MGMC.

These questionnaire-based survey items were measured using a seven-point Likert-type scale, ranging from strongly disagree/dissatisfied (1) to neutral (4) and strongly agree/satisfied (7). The survey consisted of a total of 35 questions with two main sections. The first section of the survey comprised eight questions related to demographics; the second section included questions pertaining to the major constructs (PE, EE, FC, SI, and BI) of the study. Given the exploratory nature of this study and the dearth of ESS studies in which UTAUT is comprehensively employed to measure employee behavioral intentions, we limit our report here to validating UTAUT.

Face validity and content validity of the survey questionnaire were assessed through a combination of participant observation (20+ hours) and in-depth interviews with: (a) five employees who frequently accessed ESS since the inception of KaiNexus at MGMC, (b) two management personnel involved with KaiNexus dissemination at MGMC, and (c) one process improvement coordinator in-charge of lean implementation at MGMC. Interviews yielded valuable suggestions for improving the appropriateness and meaningfulness of questionnaire items that were incorporated into the survey (Neuendorf, 2002).

Data Collection

Internal Review Board approval was sought before distributing the survey to participants at MGMC to protect the rights and welfare of the employees. Participants were informed about the voluntary nature of the study and had the option to discontinue at any point. The Qualtrics® Online system was used for survey distribution among MGMC employees. As all employees used computer- based systems to accomplish their daily tasks, it was easier for them to fill out an online survey. Data collection was conducted from March 2016–August 2016. Overall, 22% of employees participated, and 268 valid responses were received.

Participants

Participation in the survey was entirely voluntarily for the employees. Of the respondents, 80.6% were female, 34% were aged between 45–54 years, 43.6% had a bachelor's degree, and 27.9% were registered nurses. Up to 70 % of employees had more than five years of experience at MGMC, and 75.6 % had training on KaiNexus.

Data Analysis and Results

The Partial Least Squares (PLS) method, using SmartPLS (SmartPLS [Version 2.0], n.d.), was used for conducting data analysis to measure employee intentions to use the KaiNexus technology. PLS is a Structural Equation Model (SEM) largely used for technology adoption studies due to its ability to evaluate the measurement model and the structural model related to the constructs. PLS has fewer restrictions on scales, sample sizes, and residual distribution (Chin, 1998). The PLS model analysis and interpretation was done in two stages: (1) assessment of the measurement model by evaluating the reliability and validity of the items measuring each construct, and (2) evaluation of SEM. This method was adopted to first establish reliability and validity of the model before drawing conclusions about construct relationships.

For the direct effects model, which measured the effects of PE, SI, EE, and FC on behavioral intentions (BI), composite reliability scores of all constructs exceeded 0.8 which exceeds the recommended threshold value of 0.7 (Nunnally, 1978), as shown in Table 1. Composite reliability data indicate that the measures were robust with regards to internal consistency. Average Variance Extracted (AVE) and construct correlations measured discriminant validity. AVE for each measure exceeded 0.5, and the square root of AVE exceeded the off-diagonal construct correlations, consistent with the guidelines of Fornell & Lacker (1981) as seen in Table 1. This outcome satisfies the discriminant validity of the model.

Table 1: Composite Reliability, AVE, and Discriminant Validity of the Constructs

	Composite Reliability	AVE	PE	EE	SI	FC	BI
Performance Expectancy (PE)	0.94	0.79	**0.89**				
Effort Expectancy (EE)	0.96	0.83	0.64	**0.91**			
Social Influence (SI)	0.91	0.72	0.62	0.55	**0.85**		
Facilitating Condition (FC)	0.91	0.70	0.49	0.74	0.48	**0.82**	
Behavior Intention (BI)	0.97	0.91	0.83	0.63	0.62	0.51	**0.95**

*The square root of AVE is shown in diagonal.

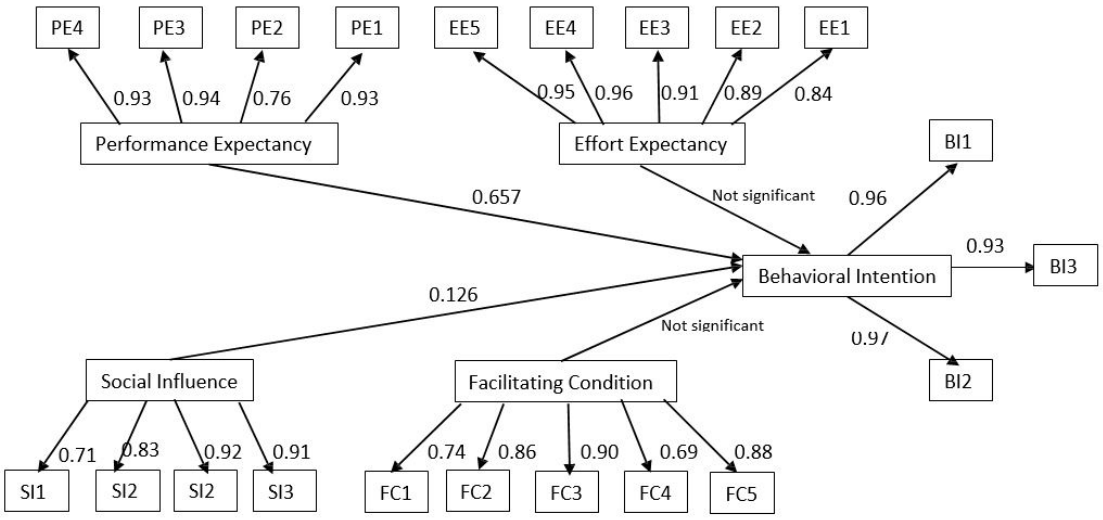
Factor loading provides information on convergent validity. The results show that factor loading on all the items was ≥ 0.7 (factors with lower factor loading values were dropped, and the model was reanalyzed), higher than the threshold value of 0.5 and higher than the cross-loadings (Peterson, 2000) as shown in Table 2. All the loadings were statistically significant, indicating non-chance relationships with the factors (Peterson, 2000).

Table 2: Factor Loading Matrix

	PE	EE	SI	FC	BI
PE1	0.93				
PE2	0.76				
PE3	0.94				
PE4	0.93				
EE1		0.84			
EE2		0.89			
EE3		0.91			
EE4		0.96			
EE5		0.95			
SI1			0.71		
SI2			0.83		
SI3			0.92		
SI4			0.91		
FC1				0.74	
FC2				0.86	
FC3				0.90	
FC4				0.70	
FC5				0.88	
BI1					0.96
BI2					0.97
BI3					0.93

The above results provide a good degree of reliability and discriminant and convergent validities. Statistical significance of the path coefficients for the direct effects model was assessed by a running the bootstrap procedure using 500 resamples in SmartPLS (SmartPLS [Version 2.0], n.d.). Figure 3 indicates that performance expectancy ($\beta = 0.66$, $p < 0.05$) and social influence ($\beta = 0.12$, $p < 0.05$) had a direct positive impact on the behavioral intentions of the employees using KaiNexus ($R2 = 0.72$). The effect of effort expectancy and facilitating conditions on employee behavioral intentions was not statistically significant at the 0.05 level.

Figure 3: Structure model result



DISCUSSION AND CONCLUSION

The objective of this research was to study employee intentions towards the use of an Electronic Suggestion System (ESS)—KaiNexus—to recommend suggestions for process improvement at the workplace. The UTAUT model proposed by Venkatesh et al. (2003) was applied to analyze employee intentions concerning the use of KaiNexus. The results show, performance expectancy and social influence had a significant positive influence on the behavioral intentions of MGMC health care employees with regards to the use of KaiNexus. Effort expectancy and facilitating conditions, however, did not have a significant influence on employee behavioral intentions.

Performance expectancy had the strongest effect on employee behavioral intentions among all the major determinants. This outcome can be attributed to a strong belief among MGMC employees that using the KaiNexus software would help improve their performance. This result is consistent with previous studies that found performance expectancy had a strong effect on behavioral intentions (Venkatesh et al., 2003; Chang et al., 2007; Yi et al., 2006). Prior studies on the adoption of healthcare robots also found that employee behavioral intentions with regards to home health care robots was significantly affected by performance expectancy (Alaiad & Zhou, 2014). The findings of this study truly reflect the participation motivation among MGMC employees to use KaiNexus for initiating process improvement.

Departmental leaders at MGMC motivated employees to engage in process improvement. This culture of improvement at MGMC focused employee intentions towards improving their daily processes. MGMC employees found KaiNexus useful because they could submit their suggestions and track their implementation, which helped make their jobs efficient. KaiNexus helped in facilitating improvement in a short time and allowed employees to observe and track the process. When employees saw their suggestions positively impacting the organization and increasing their job efficiency, they were even more motivated to use the KaiNexus platform for submitting ideas.

Facilitating conditions and effort expectancy did not have a significant influence on the behavioral intentions of the health care employees concerning the use of KaiNexus. In MGMC, 69.4 % of healthcare employees had more than five-years of experience in the healthcare sector and 43.6 % had bachelor's degrees. Thirty-four percent of the employees were aged between 45–54 years. The percentage of employees who received training on KaiNexus was 75.6 %. These figures imply that since most of the employees were computer literate, they found KaiNexus easy to work with. Further, the results on facilitating conditions revealed that the employees did not run into problems while logging suggestions on the KaiNexus platform, thus, negating the need for technical assistance. Therefore, facilitating conditions

was not a significant contributor to the behavioral intentions of MGMC's health care employees. This result contrasts with the findings of Venkatesh et al., (2003), Chang et al., (2007), and Yi et al., (2006), all of whom reported that facilitating conditions of technology affected employee behavioral intentions.

Due to ease of use of the KaiNexus software platform and the employees' prior knowledge and experience using other software, they did not find the submission of suggestions to be time consuming. As a result, effort expectancy did not have a significant positive impact on employee intentions to use KaiNexus.

Social influence had a significant positive influence on the behavioral intentions of the employees concerning KaiNexus. This result is similar to that of Ifinedo (2012), who found that usage behavior was significantly affected by social influence. MGMC employees depended on their peers' opinions when using ESS technology. The MGMC management also significantly influenced employees to submit their suggestions for continuous improvement via KaiNexus. Each employee was rewarded $10 when the suggestion they submitted on KaiNexus was implemented. To establish that no suggestion was considered inconsequential by the management, the reward amount remained fixed.

Findings of this study contribute to the body of research informing lean implementation in the healthcare sector and enhancing the quality of healthcare by increasing employee participation via software tools such as KaiNexus. These findings provide valuable information for KaiNexus service providers and administration in healthcare organizations for the successful implementation and accelerated adoption of technology which will help with process improvement among end users in the context of developed countries such as the United States.

PRACTICAL IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

The health care industry has significantly higher costs resulting from process waste. Improvement of those processes is important; however, before initiating the process of improvement, it is vital to understand the aspects in need of improvement. Often employees handling these processes on a daily basis are in the best position to recommend suggestions for improvements. More often than not, employee voices are not leveraged due to the lack of proper channels for suggestions, lack of management motivation, and lack of employee interest. The use of KaiNexus at MGMC is a perfect example of how improvement in the organization can be driven by employee beliefs concerning their ability to contribute to process improvement via recommendation platforms. Thus, the provision of suggestion platforms (ESS, KaiNexus) to garner employee opinions and the subsequent implementation of valuable recommendations by the organization form the basis of process improvement. Such a mutual partnership between employees and upper management boosts employee morale and job satisfaction in addition to increasing customer satisfaction. MGMC utilized lean techniques to institute process improvements, and tying process improvement to employee feedback has had a significant impact on the satisfaction levels of physicians, patients, and employees.

Our analysis suggests that users find KaiNexus helpful in improving their job performance and are motivated to make improvements in their daily tasks. Performance expectancy is affected by access to resources; hence, MGMC ensured that all employees had access to a computer to provide feedback. They placed a few spare computers in common areas where employees could easily log on to KaiNexus. As KaiNexus enabled transparency through the tracking of idea implementation, employees were more motivated to provide suggestions. Performance expectancy is impacted by trust in the system and support from supervisors. MGMC trained department leaders and encouraged them to use KaiNexus, thus stimulating a culture of improvement within the department and motivating employees to use KaiNexus.

Recognizing the importance of social influence, we suggested the establishment of a role-model system to identify KaiNexus champions and highlight their stories in the monthly newspaper. MGMC adopted this suggestion devoting a section of the monthly newspaper to providing a headshot of the spotlighted employee along with a brief story of the suggestion and implementation process and a link to KaiNexus where that change could be tracked. Each month, two such stories are highlighted, and efforts are made to ensure that the stories highlighted feature not only savings in terms of money, but also cus-

tomer satisfaction and time savings. By highlighting all forms of improvement, MGMC is encouraging employees to think about suggestions on a variety of fronts. Now, MGMC has begun training leaders of departments that have yet to employ KaiNexus.

The relatively small sample size (N = 268) may be justified in terms of the response rate (22%). Results may still be subject to self-selection bias, and participating employees may have preconceived notions regarding the purpose and utility of both the technology and the study. We caution against generalizing the findings beyond the site studied as substantial differences likely exist between sites. Future work could focus on the effects of moderating variables such as age, gender, education level, and experience on employee intentions to use technology. Furthermore, three-way interactions among age, gender, and experience could also be studied. Trust with technology can significantly impact user intentions in terms of technology adoption; hence, future studies should also attempt to factor in this information.

References

Alaiad, A., & Zhou, L. (2014). The determinants of home healthcare robots adoption: An empirical investigation. *International Journal of Medical Informatics, 83*(11), 825–840.

Chang, I. C., Hwang, H. G., Hung, W. F., & Li, Y. C. (2007). Physicians' acceptance of pharmacokinetics-based clinical decision support systems. *Expert Systems with Applications, 33*(2), 296-303.

Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly, 22*(1), vii–xvi.

Chopra, S., & Rajan, P. (2016). Modeling intermediary satisfaction with mandatory adoption of e-government technologies for food distribution. *Information Technologies & International Development, 12*(1), 15.

Fairbank, J., Spangler, W., & Williams, S. D. (2003). Motivating creativity through a computer-mediated employee suggestion management system. *Behaviour & Information Technology,* 22(5), 305–314.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18, 382–388.

Gagnon, M.-P., Ghandour, E. K., Talla, P. K., Simonyan, D., Godin, G., Labrecque, M., Rousseau, M. (2014). Electronic health record acceptance by physicians: testing an integrated theoretical model. Journal of Biomedical Informatics, 48, 17–27. https://doi.org/10.1016/j.jbi.2013.10.010

Graban, M. (2011). *Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement, Second Edition*. CRC Press.

Ifinedo, P. (2012). Technology Acceptance by Health Professionals in Canada: An Analysis with a Modified UTAUT Model. In *2012 45th Hawaii International Conference on System Science (HICSS) (pp. 2937–2946)*. https://doi.org/10.1109/HICSS.2012.556

KaiNexus.com. (2016a). Retrieved from https://www.kainexus.com/continuous-improvement-software/why-kainexus

Kijsanayotin, B., Pannarunothai, S., & Speedie, S. M. (2009). Factors influencing health information technology adoption in Thailand's community health centers: Applying the UTAUT model. International Journal of Medical Informatics, 78(6), 404–416.

Kim, S., Lee, K.-H., Hwang, H., & Yoo, S. (2016). Analysis of the factors influencing healthcare professionals' adoption of mobile electronic medical record (EMR) using the unified theory of acceptance and use of technology (UTAUT) in a tertiary hospital. *BMC Medical Informatics and Decision Making, 16*(1), 12.

Lindberg, E., & Rosenqvist, U. (2005). Implementing TQM in the healthcare service: A four-year following-up of production, organizational climate and staff wellbeing. *International Journal of Healthcare Quality Assurance, 18*(5), 370–384.

Mann, D. (2014). *Creating a lean culture: tools to sustain lean conversions.* CRC Press.

Manos, A., Sattler, M., & Alukal, G. (2006). Make Healthcare Lean. *Quality Progress, 39*(7). Retrieved from http://asq.org/quality-progress/2006/07/lean/make-healthcare-lean.html

Neuendorf, K. A. (2016). The content analysis guidebook. Sage.

Nunnally, J. C. (1978). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.

Peterson, R. A. (2000). A meta-analysis of variance accounted for and factor loadings in exploratory factor analysis. Marketing Letters, 11(3), 261-275.

Sanfilippo, J. S., Bieber, E. J., Javitch, D., & Siegrist. (2015). *MBA for Healthcare*. Oxford University Press.

Schaper, L. K., & Pervan, G. P. (2007). ICT and OTs: A model of information and communication technology acceptance and utilization by occupational therapists. *International Journal of Medical Informatics,* 76, S212–S221.

Simons, P., Simons, P., Backes, H., Backes, H., Bergs, J., Bergs, J, Johannesma, M. (2017). The effects of a lean transition on process times, patients and employees. *International Journal of Healthcare Quality Assurance, 30*(2), 103–118.

SmartPLS (Version 2.0) [Computer Software]. Bönningstedt, Germany: SmartPLS GmbH.

Squires, D., & Anderson, C. (2015). U.S. Healthcare from a Global Perspective. I*ssue Brief* (Commonwealth Fund), 15, 1–15.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 425–478.

Yi, M.Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management, 43*(3), 350-363.

Zejnilovic, L., Oliveira, P., & Veloso, F. M. (2012). Employees as user innovators: An empirical investigation of an idea management system. Paper presented at the annual meeting of the 43rd Decision Sciences Institute Annual Meeting, San Francisco, CA.