DOES QUALITY MANAGEMENT PRACTICE INFLUENCE PERFORMANCE IN THE HEALTHCARE INDUSTRY?

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This research examines the relationship between quality management (QM) practices and performance in the healthcare industry via the conduct of three studies. The results of this research contribute both to advancing QM theory as well as in developing a unique text mining method that is illustrated by examining QM in the healthcare industry. Essay 1 explains the relationship between operational performance and QM practices in the healthcare industry. This study analyzed the findings from the literature using meta-analysis. We applied confirmatory semantic analysis (CSA) to examine the Baldrige winners' applications. Essay 2 examines the benefits associated with an effective QM program in the healthcare industry. This study addressed the research question about how effective QM practice results in improved hospital performance. This study compares the performance of Baldrige Award-winning hospitals with matching hospitals, state average, and national average. The results show that the Baldrige Award can lead to an increase in patient satisfaction in certain periods. Essay 3 discusses the contribution of an online clinic appointment system (OCAS) to QM practices. An enhanced trust model was built on understanding the mechanism of patients' trust formation in the OCAS. Understanding the determinants related to patients' trust and willingness to use OCAS can provide valuable guidance for medical institutions to establish health information technology-based services in the quality service improvement programs. This research has three significant contributions. First, this research analyzes the role of QM practices in the healthcare industry. Second, this research attempts to develop a unique text mining method. Third, this research provides a validated trust model and contributes to the body of research on the trust of healthcare information technology.

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BACKGROUND

This research analyzes the relationship between operational performance and quality management (QM) practices in the healthcare industry via the conduct of three studies. The results of this research contribute both to advancing QM theory as well as in developing a unique text mining method that is illustrated by examining QM in the healthcare industry. This research is conducted and presented using a three-essay format where each essay makes an independent contribution to study and practice. Collectively, three essays contribute to research in the field of healthcare quality management. Essay 1 employs meta-analysis and Confirmatory Semantic Analysis (CSA) to understand the influence of QM practices on operational performance in the healthcare industry. The extensive body of literature on QM in academia provides the data for our meta-analysis. The widespread reports on QM in the healthcare industry enable us to do the text mining analysis. Results generated by meta-analysis show the statistically significant correlation between six Baldrige Excellence Framework categories and operational performance. CSA shows that three constructs are positively correlated with operational performance. When comparing the meta-analysis and CSA results, this study identifies a gap between the academic literature and industry practices. Essay 2 analyzes the benefits associated with Baldrige as an effective QM program in the healthcare industry. This study addresses the research question about how effective QM practice results in improved hospital performance. To answer this question, researchers compare the performance of Baldrige Award-winning hospitals with matching hospitals, state average, and national average. The performance, as measured by patient satisfaction, is collected from the public database. Researchers use the event study method to evaluate the difference between the award winners and control parties based on the mean and estimated median percentage changes. According to the research results, the Baldrige Award can lead to an increase in patient satisfaction in specific periods. Essay 3 discusses the contribution of an online clinic

appointment system (OCAS) to QM practices. This research contributes a detailed understanding of patient's trust formation mechanism. Understanding the determinants related to patients' trust and willingness to adopt OCAS can guide medical institutions to establish health information technology-based services in the quality service improvement plans.

This research three significant contributions. First, this research analyzes the QM practices in the healthcare industry and contributes to QM theory development. The study explores how QM practices affect performance in healthcare organizations, which is different from other sectors. Second, this research attempts to develop a unique text mining method, namely the Confirmatory Semantic Analysis (CSA). This method provides the power to process large, document-sized, and structured documents in the QM study. Third, this research builds an enhanced trust model. This model provides empirical support for trust research and QM practices. It also confirms the role of trust in explaining the acceptance of healthcare information technology.

ESSAY 1

HOW DO QUALITY MANAGEMENT PRACTICES AFFECT OPERATIONAL PERFORMANCE? A STUDY OF HEALTHCARE ORGANIZATIONS

1.1 Introduction

Researchers consider QM as one of the most significant themes in the last three decades of operations management studies. Substantial research shows the significant positive relationship between the operational performance and QM practices (Flynn et al., 1995; Kaynak, 2003; Kim et al., 2012; Samson and Terziovski, 1999). Although definitional issues of QM practices are addressed in prior research, there is a need to examine the effectiveness of QM practices for current healthcare organizations, which are under high pressure to improve their performance. Mixed findings on this problem and the growing need to strengthen the QM practice-performance link motivate this study. The extensive body of literature on QM in academia provides the data for our meta-analysis. The widespread reports on QM in the healthcare industry enable us to do text mining analysis by using Confirmatory Semantic Analysis (CSA).

This study employed meta-analysis and CSA to analyze the influence of QM practices on operational performance in the healthcare industry. Mainly, the objective of this research is to answer two research questions: (1) Do QM practices positively correlate with operational performance in the healthcare industry? (2) Do gaps exist between the findings from the literature and practices in the healthcare industry?

To answer the two research questions, we applied two analysis methods: meta-analysis and CSA. Meta-analysis focuses on the commonly investigated the connection between QM practices and performance. It assesses the relationship between two constructs by analyzing the empirical studies on the Baldrige Award. We collected articles from the secondary database using Boolean expressions. CSA is a text mining method, focusing on analyzing the meaning

of words and passages from a well-structured vast text corpus. We collected Baldrige Award recipients' information from the official Baldrige website. All available Baldrige winners' summaries were included for text mining analysis, including the award recipients in the health care sector.

According to the research results, CSA supports the significant positive relationship between healthcare operational performance and three categories: leadership, operations focus, and measurement, analysis, and knowledge management (MAKM). Besides, the moderating effects exist between leadership, operations focus, and results. While meta-analysis results support the effectiveness of the Baldrige framework, the comparison with CSA results shows the gap between the academic literature and industry practices. To study the characteristics of the healthcare industry, we compared the text mining results between Baldrige award recipients in the health care sector and all award recipients. The comparison results generate insights for healthcare organizations to understand their strength and identify opportunities for quality improvement.

This study has two significant advantages. First, we successfully used multiple analysis methods to probe the relationship between operational performance and QM practices in the healthcare industry. As a text-mining approach, CSA provides a fresh perspective to investigate healthcare organizations' QM practices. Meanwhile, as a traditional method to integrate prior research results, meta-analysis, coupled with CSA, serves as a powerful tool to answer relevant research questions. Second, our study reveals the gap between the findings from academic literature and current healthcare industry practices. Even though the Baldrige framework is well validated and utilized in service and manufacturing industries, in our study, only three QM practices are positively associated with the healthcare operational performance.

For theoretical contributions, this study introduced CSA as a new text-mining approach. This approach can unearth keywords and latent factors from well-structured long documents.

It does not require an enormous sample size, so it is more convenient to use than traditional text mining methods. Moreover, meta-analysis integrates prior research results to explore the actual relationships between QM practices and operational performance and helps to mitigate bias from different samples.

For managerial implications, research results generate insights to help healthcare organizations improving their operational performance. For instance, the physician leadership of the healthcare team can significantly improve operational performance (Nembhard and Edmondson, 2006). Also, the process-oriented operational focus is on foundations in the healthcare operation system, which can serve as a starting point for the healthcare organization's improvement initiatives. Moreover, even though hospitals collect feedback from patients, their customer engagement is still relatively low, thus undermining their efforts to improve their operational performance. When comparing the results from healthcare with other industries included in the Baldrige, we explore possible reasons to explain the weakness of customer focus in healthcare, which also provides recommendations and directions for healthcare organizations.

1.2 Literature Review

The relationship between operational performance and QM practices is an exciting topic in the operations management area. QM could be studied by analyzing a set of QM practices and their expected relationship to quality performance (Flynn et al., 1995). Typically, QM practices will change across different situations. For example, according to Figure 1, this Baldrige Performance Excellence Framework describes the QM practices as the combination of six categories: leadership, strategy, customers, workforce, operations, and MAKM (NIST, 2019). These categories directly or indirectly affect the seventh category, results, which means the outputs and outcomes accomplished by the organizations.

Figure 1: Baldrige Excellence Framework 2017-2018 (NIST, 2019)

Previous research shows that QM practices have a significant favorable influence on performance (Flynn et al., 1995; Kaynak, 2003; Kim et al., 2012; Samson and Terziovski, 1999). As one of the most critical fields in the healthcare industry, QM practices have significant causal relationships with the QM performance (Mannon, 2014; Meyer and Collier, 2001; Mosadeghrad, 2015; Shaw et al., 2014; Westphal et al., 1997). For instance, Total Quality Management (TQM) is a quality management approach to help organizations enhance the quality of their processes, products, and services. TQM helps healthcare organizations understand customers' requirements and implement the government's regulations into their operational performance (Mosadeghrad, 2015; Øvretveit, 2000). Moreover, the International Organization for Standardization (ISO) certification is a tool to help companies provide excellent products and services to their customers. In the healthcare industry, ISO certification could assist hospitals in improving or regulating the quality and safety of health services (Shaw et al., 2014).

As well as the growing amount of research in QM practices, new types of practice methods were introduced into the healthcare industry. For example, the Baldrige Excellence Framework plays a vital role in the healthcare industry management (Griffith, 2017; Meyer and Collier, 2001). Baldrige Excellence Framework is quality management focused

organizational excellence program. The framework provides a systematic approach for healthcare organizations to improve operational performance. Following the Baldrige framework, healthcare organizations can identify critical health care criteria for performance excellence, core values and concepts, guidelines for evaluating the current operation process, and the most useful key terms (NIST, 2017). The practicality of the Baldrige model is supported by empirical pieces of evidence (Goldstein and Schweikhart, 2002; Manjunath et al., 2007; Meyer and Collier, 2001; Van and Koch, 2009).

Healthcare organizations need to understand their QM practices. In recent years, healthcare organizations are under high pressure to improve their operational performance. For example, both patients and governments show an increasing concern about the quality of health services provided. The high cost of the US healthcare system does not automatically produce a uniformly high quality of health care (Mukamel et al., 2014). Another example from the United Kingdom further illustrates this point. Inefficient QM practices wasted the government's investment and lowered the operational performance of its healthcare. In the past half-century, the National Health Service (NHS) desires to provide universal access to quality medical services. However, NHS is under pressure to adapt to growing expectations with a limited budget because of the backlog of massive services and long waiting times (Umble and Umble, 2006). Healthcare is different from other industries. It has a unique structure, a particular customer group, and a special operating mode. Therefore, it is crucial for healthcare organizations to clearly understand the characteristics of the system and take corresponding improvement methods.

1.3 Methodology

1.3.1 Meta-Analysis

Meta-analysis is a statistical analysis that focuses on the commonly investigated associations between different constructs. This method combines the results of multiple

scientific studies. Prior research shows that the meta-analysis method could be used to assess the generally accepted associations between QM practices and firm performance (Nair, 2006). This study used the meta-analysis method to analyze the data collected from empirical studies related to the Malcolm Baldrige National Quality Award (MBNQA). Meanwhile, we examined the existence of moderating factors in the relationships. Following previous studies (Mackelprang et al., 2010; Nair, 2006; Schmidt and Hunter, 2014; Xu et al., 2020), this study proposed four hypotheses to test the relationship between operational performance and QM practices from the perspective of the overall and individual, and analyze the existence of moderating factors:

H1. For healthcare organizations, the relationship between operational performance and QM practices is positive.

H2. For healthcare organizations, moderating factors exist in the relationship between operational performance and QM practices.

H3. For healthcare organizations, the relationships between operational performance and individual QM practices are positive.

H4. For healthcare organizations, the moderating factors exist in the relationships between the operational performance and individual QM practice.

This study followed the approach suggested by other researchers and tested four hypotheses in two stages (Mackelprang et al., 2010; Nair, 2006; Schmidt and Hunter, 2014; Xu et al., 2020). Stage-I evaluates the H1 and H2, the correlation between general QM practices and results. At this stage, we analyzed the relationship between QM practices and results by averaging correlations among individual QM practices and performance. According to Table 1, firstly, we calculated the compound attenuation factor (A_i) for all sample data. Then, we calculated the weights for each study (W_i). The error variance (e) relies on the weighted sample mean correlations and the number of studies. Stage-II evaluates the H3 and H4, the relationships between the performance and individual QM practices. At this stage, the Baldrige and performance reliabilities were recorded for each study. After that, we computed the

compound attenuation factor (A_i). Then, we calculated the study weights (W_i), correlations, and error variance (e).

Table 1: Meta-Analysis Procedures

#	Items	Formula
Step 1	Attenuation factor	$A_i = \sqrt{\alpha_{xxi}\alpha_{yyi}}$
Step 2	Individual study weights	$W_i = N_i A_i^2$
Step 3	Correct Correlations	$r_i' = r_i / A_i$
Step 4	The weighted sample mean correlations	$\bar{r} = \sum N_i r_i / \sum N_i$
Step 5	The weighted mean corrected correlations	$\bar{r'} = \sum W_i r_i' / \sum W_i$
Step 6	Corrected study sampling error variance	$e_i = (1 - \bar{r}^2)^2 / (N_i - 1) A_i^2$
Step 7	The weighted mean sampling error variance	$\bar{e} = \sum W_i e_i / \sum W_i$
Step 8	The weighted mean-variance of corrected correlations	$S_{r'}^2 = \sum W_i r_i' / \sum W_i$
Step 9	Estimated population correlation variance	$S_\rho^2 = S_{r'}^2 - \bar{e}$
Step 10	RATIO1	$RATIO1 = \bar{r'} / S_\rho$
Step 11	RATIO2	$RATIO2 = \bar{e} / S_{r'}^2$

Prior studies suggested the use of two heuristics to guide hypotheses testing (Gerwin and Barrowman, 2002; Hunter and Schmidt, 1990; Mackelprang et al., 2010; Nair, 2006). This study followed the suggestion and calculated these heuristics to make the decision. According to Table 1, RATIO1 equals to the quotient of weighted mean corrected correlations and estimate of the population correlation standard deviation. If RATIO1 ≥ 2, we believe it is quite safe to conclude that a positive relationship between two variables. RATIO2 equals to the quotient of weighted mean sampling error variance and weighted mean-variance of the corrected correlations. If RATIO2 < 0.75, it is quite safe to believe the existence of the moderating factors.

Table 2: Summary of Articles

Authors	Sample and Unit of Analysis	Method(s)
Badri et al. (2006)	220 respondents (United Arab Emirates universities and colleges)	Regression analysis & CFA & SEM analysis
Flynn and Saladin (2001)	4264 respondents (plants from four countries and three industries)	Path analysis & Regression analysis
Jayamaha et al. (2008)	91 respondents (New Zealand organizations that participated in self-assessments)	PLS-SEM
Kim and Oh (2012)	613 surveys (physicians, nurses, medical technicians, pharmacists, and administrative staff)	CFA & SEM analysis
Lee et al. (2003)	109 respondents (senior or middle manufacturing managers in Korean)	Correlation analysis & Regression analysis
Meyer and Collier (2001)	220 respondents (hospitals in the U.S.)	CFA & SEM analysis
Pannirselvam et al. (1998)	69 applications (Arizona State Governor's Quality Award)	Canonical analysis & CFA analysis
Peng and Prybutok (2015)	161 respondents (city of Denton employee)	PLS-SEM
Sabella et al. (2014)	445 respondents (respective hospitals)	Correlation and regression analysis
Wilson and Collier (2000)	160 fully completed surveys (manufacturing firms)	SEM

The sample for Meta-analysis is collected from ABI/INFORMS Global database. ProQuest designed this database to supply the latest, comprehensive, and essential scholarly resources to business researchers. We used the computer search with following searching expression: *(Malcolm Baldrige National Quality Award) or (Malcolm Baldrige Award) or (Baldrige Quality Award) or (Baldrige Award) or (MBNQA)*. Targeted articles are those which empirically analyze the correlation between QM practices and performance. Table 2 provides a list of articles included in this study. In total, there are ten useful articles, and three of them used samples from the healthcare industry.

1.3.2 Confirmatory Semantic Analysis (CSA)

Confirmatory semantic analysis (CSA) is the modified latent semantic analysis (LSA). It analyzes the correlation between predefined constructs from the well-structured long documents. LSA is particularly suitable for paragraph-length text. However, when using LSA to analyze long text, it will cause profound information loss. For example, LSA can obtain reliable results by analyzing the abstract, but it is not suitable for analyzing the entire article. In comparison, CSA is designed for long documents. Scholars can use CSA to process large, document-sized, structured text corpus, and get valuable results.

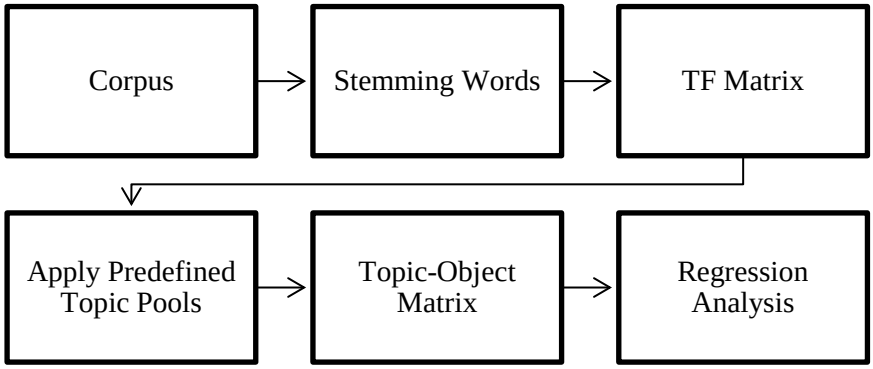

Figure 2: CSA Process

Usually, there are six steps to use CSA. According to Figure 2, firstly, we need a well-structured text corpus with a certain number of objects. The object could be defined as a document or file. Next, the text-mining software will use text parsing and text filter functions to stem words. The software will construct the generated term-frequency (TF) matrix. After that, researchers should identify the topic pools based on the research discipline and field. When applying the predefined topic pools into the TF matrix, the software can compute the term/document loadings and generate the topic-object matrix. Finally, multiple analysis methods could be applied to evaluate the loadings, test the hypotheses, and produce the results.

This study used CSA to deal with the corpus achieved by the Baldrige Award recipients' applications. Researchers collected applications for all Baldrige Award winners in the health

care sector from 1999 to 2016. We picked up the organizational profile chapter from all award winners' applications. In total, there is 22 available organizational profile of award recipients. Following two hypotheses were used to compare the research results between the CSA and meta-analysis:

> *H5. For healthcare organizations, the relationships between operational performance and individual QM practices are positive.*
>
> *H6. For healthcare organizations, moderating factors exist in the relationships between operational performance and individual QM practice.*

MBNQA applications are suitable corpus for CSA because of the following reasons: First, these applications have a consistent construct. All applicants follow the Baldrige Excellence Framework to prepare their applications for the MBNQA, which meets the requirement of well-structured documents. Second, all applicants need to answer the same questions in seven categories and give evidence to prove their answers. Therefore, researchers can follow the Baldrige framework to divide applications into different sections. Third, the length of the applications is sufficient for analysis. The organizational profile is the first chapter of the MBNQA applications. Healthcare organizations need to give a snapshot of the organization and its strategic environment in this chapter (NIST, 2019). There are two sections included in the organizational profile chapter, which is suitable for the CSA analysis. Fourth, the Baldrige Excellence Framework has been in use by the U.S. industry for over 30 years. Researchers can quickly collect enough and representative sample sets. Finally, all recipient's applications are public and free to download, which significantly increases the contribution of the study. Other researchers could easily replicate the study to verify or extend the research topic.

1.4 Results

1.4.1 Meta-Analysis

To test the correlation between operational performance and QM practices, researchers

considered six categories, including leadership, strategy, customers, workforce, operations, and MAKM as QM practices, and the seventh category, results was considered as operational performance. Researchers followed previous research and applied the two-stage approach of analysis. Stage-I evaluated the hypotheses H1 and H2, the relationship between the general QM practices and operational performance. Stage-II tested hypotheses H3 and H4, the relationship between individual practices and results. In this study, researchers assessed the relationships between six Baldrige categories and the Baldrige results category separately. Finally, we compared two ratios with the benchmark in the heuristics approach to conclude all hypotheses.

Table 3: Stage-I Data

Study	N	T_α	P_α	r	r'	e	W
Abdulla Badri et al. (2006)	220	0.90	0.91	0.42	0.47	0.00	180.62
Flynn and Saladin (2001)	4264	0.86	0.80	0.55	0.66	0.00	2916.58
Jayamaha et al. (2008)	91	0.91	0.95	0.69	0.74	0.01	78.67
Kim and Oh (2012)	613	0.97	0.97	0.19	0.20	0.00	576.86
Lee et al. (2003)	109	0.86	0.86	0.51	0.59	0.01	80.17
Meyer and Collier (2001)	220	0.85	0.83	0.12	0.15	0.00	155.07
Pannirselvam et al. (1998)	69	0.86	0.85	0.75	0.88	0.01	50.34
Peng and Prybutok (2015)	161	0.95	0.96	0.30	0.31	0.00	146.83
Sabella et al. (2014)	445	0.77	0.89	0.11	0.14	0.00	304.03
Wilson and Collier (2000)	160	0.87	0.88	0.13	0.14	0.01	122.26

N: sample size; T_α: Baldrige reliability; P_α: performance reliability; r: Baldrige-performance sample reliability; r': Baldrige-performance corrected correlation; e: error variance; W: the weight of the study obtained by multiplying sample size with attenuation factors.

Table 3 shows the data used in Stage-I. According to the table, ten studies use empirical methods to study the relationship between categories and results. Reliabilities and correlation between the categories and results were recorded. After that, two heuristics were calculated to guide hypotheses testing. At Stage-I, we computed RATIO1 equals 2.43, and RATIO2 equals 0.03. Because RATIO1 is greater than 2, it is safe to conclude that the relationship between the two is positive. Thus, we can establish the conclusion that QM practices are positively correlated with operational performance in the health care sector. Since RATIO2 is less than 0.75, it is safe to lead to the conclusion that the moderating factors exist between the QM practice and results. Therefore, in the health care sector, the correlation between operational performance and QM practices is influenced by moderating factors. In summary, meta-analysis results supported the H1 and H2 of the overall relationship between operational performance and QM practices in the health care sector.

To evaluate the influence of individual QM practices on performance, we assessed the relationships between six QM practices and results separately. Table 4 shows the summarized relationship between the six Baldrige Excellence Framework categories and the results category. This study assumed that six categories are significant QM practices. The operational performance is measured by the results category in the Baldrige Excellence Framework.

Table 4: Summarized Stage-II Data

Categories	N	r	r'	e	W
Leadership	6243	0.48	0.56	0.00	4483.66
Strategic Planning	5630	0.50	0.60	0.00	3803.24
Customer Focus	5643	0.34	0.40	0.00	3987.72
MAKM	5630	0.53	0.63	0.00	3913.06
Workforce Focus	6352	0.43	0.49	0.00	4877.57
Operations Focus	6352	0.50	0.58	0.00	4671.14

Table 5 shows the results of RATIO1 and RATIO2 for six individual QM practices.

According to Table 5, the relationships between individual QM practices and results are positive. The moderating factors exist between individual QM practices and results. Therefore, results support H3 and H4 of the positive correlations between individual QM practices and operational performance, and these relationships are influenced by moderating factors.

Table 5: Stage 2 Results: Test H3 and H4

Categories	RATIO1	RATIO2
Leadership	2.077	0.016
Strategy	2.006	0.013
Customers	2.858	0.056
MAKM	3.109	0.026
Workforce	2.668	0.039
Operations	2.379	0.020

In conclusion, meta-analysis results support the existence of a positive relationship between general QM practices and operational performance. Moderating factors exist between general QM practices and results. Also, research results show that the relationships between individual QM practices and operational performance are positive. These relationships are influenced by moderating factors.

1.4.2 Confirmatory Semantic Analysis (CSA)

This study used CSA to evaluate the relationship between individual QM practices and performance in the health care sector. Baldrige Excellence Framework has six QM practices. Researchers measured performance as the Results category in the Baldrige framework. The text-mining software used in the study is SAS® Enterprise Miner™13.2. We used Minitab®17 with a stepwise regression method to fulfill the regression analysis. The prespecified criterion for the stepwise regression to select predictive variables is the significance of the variable.

According to Table 6, in the health care sector, three QM practices show a significant favorable influence on performance results. Moreover, a moderator exists between the

leadership, operation focus, and performance results. When analyzing the combination of six industry sectors included in the MBNQA, three QM practices show significant positive effects on the performance, and moderators exist between the relationship of certain QM practices and performance.

Table 6: CSA Results

Health Care Results		**Overall Results**	
Term	Coefficient	Term	Coefficient
MAKM	0.393*	MAKM	0.166**
LS	2.136***	SP	2.105***
OF	2.389***	CF	-0.244**
LS*OF	-0.0456***	CF*LS	0.016**
		LS*WF	-0.048**

Note: MAKM=Measurement, Analysis, and Knowledge Management, SP=Strategy, CF=Customers, WF=Workforce, LS=Leadership, OF=Operations. Significance: $*$: α=0.1, $**$: α=0.05, $***$: α=0.01.

1.4.3 Comparison between the Meta-Analysis and CSA

While the meta-analysis results support the effectiveness of the Baldrige framework, the comparison with the CSA results shows the gap between the academic literature and industry practices. For the correlation between QM practices and performance, meta-analysis results show that individual QM practices are positively correlated with results. However, the results of CSA support that three categories positively affect healthcare operational performance (leadership, operations, and MAKM). For the moderators, based on the results of meta-analysis, moderating factors exist between the correlations of performance and three individual QM practices (leadership, strategy, and MAKM). Nevertheless, the results of CSA support the existence of moderating factors between the correlations of performance and two individual QM practices (leadership and operations focus).

1.5 Discussions and Conclusions

First, we use the multiple methods analyses approach to probe the relationship between

QM practices and operational performance in the Baldrige health care sector. Second, our study reveals the gap between the findings from academic literature and healthcare industry practices. Third, our results generate various insights for healthcare organizations to consider when improving their operating performance. For example, the physician leadership of the healthcare team can significantly improve operational performance (Nembhard and Edmondson, 2006). Besides, the focus of the process-oriented operation is an essential foundation of the healthcare operation system and serves as a starting point for healthcare organizational improvement initiatives.

The healthcare industry is significantly different from other sectors. Based on the comparison between the research results of the health care sector and overall results in the MBNQA, only MAKM shows a significant positive influence in both analyzed processes. For example, leadership and operations focus has a significant impact on performance in the health care sector. However, when considering the overall results, including all Baldrige Award recipients in six sectors, neither leadership nor operations focus shows a considerable influence on performance. Baldrige Excellence Framework is using by six sectors: manufacturing, service, small business, education, health care, and nonprofit/government. Research results show that strategic planning and customer focus are only significant for the overall results, not the results in the health care sector. It points out the importance for healthcare organizations to improve customer service. Even though hospitals collect feedback from patients, their customer engagement is still relatively low, thus undermining their efforts to improve their operational performance. Therefore, we need to conduct further research to analyze the role of patients in hospitals.

The major limitation of this study is the lack of articles on the Baldrige Excellence Framework health care sector. Future research can release the requirement for targeted materials to include alternative quality management frameworks. Moreover, future work could

compare the results between the health care sector with other sectors in MBNQA. For example, researchers can examine the health care sector with the service sector. The comparison between the two industries can provide more insights into the role of customer focus on quality management.

In conclusion, this study employs meta-analysis and CSA to investigate the impact of QM practices on operational performance in the healthcare industry. According to the research results, meta-analysis shows that all six categories are positively correlated with operational performance measures by business results. CSA shows that three categories have statistically positive influences on operational performance. When comparing the meta-analysis and CSA results, our study identified a gap between the academic literature and industry practices. This study provides insights for healthcare organizations to consider when planning to improve operational performance.

ESSAY 2

VALUE OF THE BALDRIGE AWARD TO HOSPITALS

2.1 Introduction

Baldrige Excellence Framework can help hospitals to achieve healthcare performance excellence. Applicants of the Baldrige Award in the healthcare sector use health care criteria to explore their advantage and disadvantage for improvement in seven categories: leadership; strategy; customer; measurement, analysis, and knowledge management; workforce; operations; and results. To receive MBNQA, the highest level of national recognition for Baldrige performance excellence, applicants must do an excellent job in all seven categories and follow the health care criteria for practices. Among these requirements, the customer category focuses on the engagement of patients and other customers for ongoing marketplace success. It is an essential part of the leadership triad, which points out the value of the leadership focus on customers. To receive the MBNQA, healthcare applicants should provide exceptional quality healthcare for their patients and other customers. The purpose of this research is to analyze whether the Baldrige Award recipients in the healthcare sector have provided better quality healthcare than comparison parties. This research used the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey to evaluate Baldrige Award recipients from the patient experience perspective. The research results show that there is a significant difference in patient experience results between the MBNQA recipients and comparison parties. These results support the benefits associated with striving for the Baldrige Award in the healthcare sector.

This study analyzed the benefits associated with Baldrige as an effective QM program in the healthcare industry. Baldrige Excellence Framework focuses on helping organizations to improve the performance and get sustainable results. It is adaptable to any health care organization’s needs (NIST, 2019). As an example of the QM programs, Baldrige uses the

Health Care Criteria for Performance Excellence (HCCPE) to help healthcare organizations to improve the quality of health care services. The study's research question is: "Does effective QM program as measured by the Baldrige Award lead to improved hospital performance as measured by patient satisfaction?" To answer this question, researchers compared the performance of Baldrige Award-winning hospitals with matching hospitals, state average, and the national average. The performance, as measured by patient satisfaction, was collected from the HCAHPS survey. After that, the effectiveness of QM practices in improving hospital performance was determined.

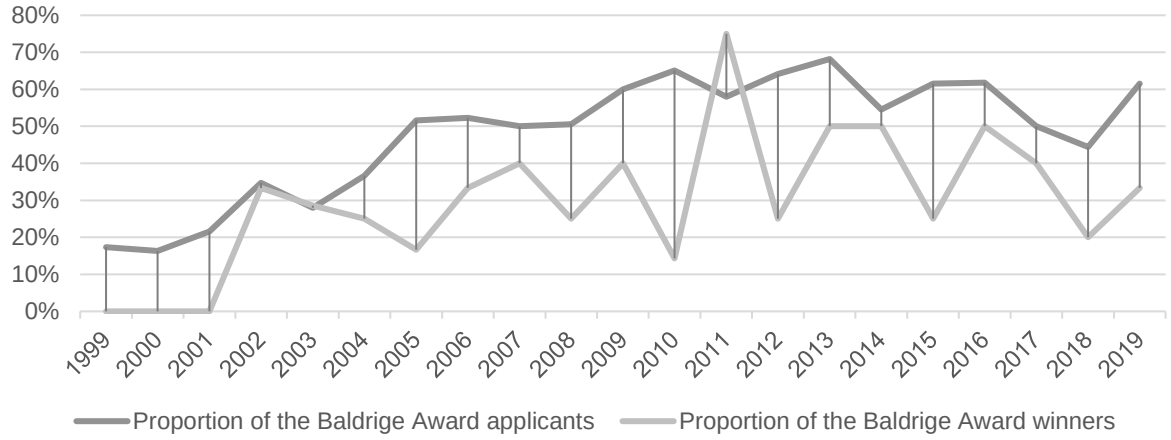

Figure 3: The Baldrige Award Applications and Winners in the Healthcare Sector

Baldrige has been used in the healthcare industry for around 20 years. Healthcare organizations follow the Baldrige Excellence Framework as guidance to ensure the quality of health service. In the academic field, earlier research confirmed the value of the Baldrige Award in the healthcare industry (Meyer and Collier, 2001; Schulingkamp and Latham, 2015). In the industrial field, healthcare organizations applying for MBNQA have always occupied an essential proportion of all applicants. According to Figure 3, the percentage of Baldrige Award applicants in the healthcare sector keeps increasing from 1999 to 2019. The rate of award recipients in the healthcare sector also shows the long-term increasing trend. Both proportions fluctuate around 50% in the last decade. Therefore, Baldrige has a considerable influence in

the healthcare industry, and it plays a fundamental role in helping healthcare organizations improve service quality.

This study focuses on evaluating patient satisfaction of Baldrige Award recipients in the healthcare sector. To collect patient satisfaction information, researchers used the HCAHPS survey from 2008 to 2018. HCAHPS is the first national, standardized, publicly reported survey of patients' experiences in healthcare organizations. In 2006, Centers for Medicare & Medicaid Services (CMS) implemented the first HCAHPS survey. In 2008, CMS published the first public report of HCAHPS results. As a patient-centered database, HCAHPS supplies the survey results of patients' experiences collected from most hospitals in the United States (Bentley-Kumar et al., 2016; Giordano et al., 2010). Researchers claimed that HCAHPS is a critical quality measure in the patients' satisfaction analysis (Squires et al., 2012; Zusman, 2012). Therefore, researchers believe that using HCAHPS can best reflect the patients' experience and satisfaction in the Baldrige Award-winning hospitals and comparison parties.

This paper is organized as follows: The next section discusses the theoretical foundation. Section 3 explains the hypothesis development. Subsequently, Section 4 describes the design of the survey instrument and data collection, and Section 5 reports the data analysis and results. Section 6 discusses the contributions and limitations. Finally, Section 7 concludes the paper with a summary of the study outcomes.

2.2 Literature Review

2.2.1 Survey Study and Baldrige Award

Scholars have used the survey study as a method to examine the effectiveness of the Baldrige Award for a long time. Researchers believe that using survey data can well understand and explain the validity and reliability of the Baldrige Excellence Framework. Also, the use of the survey study can help scholars discover the relationship between QM practices and operational performance. For example, in the manufacturing sector, researchers used the

manufacturing survey data to evaluate the validity of the Baldrige framework and confirmed the significant causal relationship between various QM practices and the organizations' performance (Curkovic et al., 2000; Flynn and Saladin, 2006; Wilson and Collier, 2000). Flynn and Saladin (2001) used the survey analysis and World Class Manufacturing (WCM) database to analyze evidence on the validity of Baldrige frameworks. They invited participants from five countries and collected plant-level responses from 164 plants. Results show that the Baldrige has made proper adaptations to improve its structures. Moreover, in the government sector, Prybutok et al. (2011) evaluated the applicability of the Baldrige criteria with the survey data collected from a city government. They collected data with the single-site case study methodology, and results show the effectiveness of the Baldrige criteria. After that, Peng and Prybutok (2015) used government survey data to analyze the relative efficacy of the Baldrige framework within the government organization and compare it with the effectiveness of the categories in different sectors.

In the healthcare industry, Meyer and Collier (2001) used the empirical test to analyze the causal relationship in the Baldrige Health Care Pilot Criteria and claimed that the results were statistically significant in many causal relationships in the Baldrige model. Researchers collected survey data from 220 general acute care hospitals in the US. The study's results confirmed the statistically significant causal relationship in the Baldrige criteria. Schulingkamp and Latham (2015) compared the Baldrige Award recipients and competitors in the healthcare industry. They collected data from three categories, including the HCAHPS survey in 10 measures. Research results support the significance of all HCAHPS hospital experience measures, but one question, "Doctor always communicated well," is not statistically significant with the Bonferroni correction at 0.001 confidence level. Schulingkamp and Latham believed the evidence supports the hypothesis that the Baldrige Health Care Criteria for Performance Excellence can help healthcare organizations to provide better patient experience compared

with their competitor in the geographic markets. Therefore, prior studies support the use of the survey study in analyzing the Baldrige Award in the healthcare industry.

2.2.2 Event Study and QM Program

Event study methodology focuses on measuring the average "abnormal" change in the target variable for the samples within the given time intervals when a particular event happened (Hendricks and Singhal, 1996, 1997). The basic idea is to test for the statistical significance of the average abnormal returns in an estimated period for a special event. The estimated period includes two parts, the implementation period and the postimplementation period. In terms of this research, the event study can be identified as the average abnormal change in the patients' satisfaction for the sample hospital in 5 years. The implementation period is two years before the sample hospital received the Baldrige Award, and the postimplementation period is two years after it received the Baldrige Award.

Scholars believe that event study is a suitable method in analyzing the effectiveness of the QM program (Hendricks and Singha, 1996, 1997, 2001a; Subedi and Maheshwari, 2007; Zhang and Xia, 2013). The Baldrige Award winners show higher earnings and sale growth than control parties in the manufacturing sector (Subedi and Maheshwari, 2007). Moreover, winning the Baldrige can result in better performance and higher achievement of a long-term advantage in various industries (Zhang and Xia, 2013). For example, Hendricks and Singha (1996) estimated the mean "abnormal" change in the stock price of a list of quality award winners. They believed that a firm that won a quality award, like Baldrige, should have implemented an effective quality improvement program. Hendricks and Singhal (2001b) continued their study by comparing the long-run stock price of quality award winners in 10 years. The results show that award winners significantly outperform in the postimplementation period.

2.3 Hypotheses

Baldrige Excellence Framework can help award winners to achieve healthcare performance excellence. Healthcare organizations use traditional health care quality frameworks like Donabedian's conceptual framework to improve health care quality (Ayanian and Markel, 2016; Donabedian, 2002; Langley et al., 2009). Donabedian's conceptual framework proposed using the triad of structure, process, and outcome to evaluate the quality of medical care (Ayanian and Markel, 2016). However, traditional health care quality frameworks focus on individual characteristics (Schulingkamp and Latham, 2015). Compared to these conventional health care quality frameworks, the Baldrige Excellence Framework is a comprehensive and integrated framework that focuses on helping healthcare organizations find and leverage their strengths and prepare to face challenges (NIST, 2019). Baldrige helps organizations address issues and provides guidelines in managing the organizations as a unified whole to improve the performance. Baldrige encourages healthcare organizations to choose suitable quality management tools, like Six Sigma and TQM, to optimize the quality management system. Therefore, this study proposes that in the category of patient experience, the Baldrige Award winners perform better than the control parties, including Baldrige award winners' matching hospitals in the geographic markets, the Baldrige award winners' state average, and the U.S. national average. Thus, researchers proposed the following hypotheses:

> *H1. Winning the Baldrige Award will help the hospital achieve better patient satisfaction than its matching hospital.*
>
> *H2. Winning the Baldrige Award will help the hospital achieve better patient satisfaction than the state average.*
>
> *H3. Winning the Baldrige Award will help the hospital achieve better patient satisfaction than the national average.*

2.4 Methodology

2.4.1 Sample Selection

This research used the event study methodology to analyze the survey data to examine

the effectiveness of QM practices in improving performance. Firstly, researchers found healthcare organizations that had won the MBNQA between 2002 and 2019. Table 7 shows the list of Baldrige Award recipients in the health care sector. According to Table 7, MBNQA was awarded to 27 healthcare organizations, two of which won twice. North Mississippi Health Services received the award in both 2006 and 2012, and Southcentral Foundation received the award in both 2011 and 2017. Because some award winners are running an extensive healthcare system, this study selected the most representative hospital in the order based on the characteristics of the system and the number of beds.

Table 7: List of Baldrige Award Recipients in the Health Care Sector

Year	Health Care Winner	Zipcode	# beds
2002	SSM Health Care	63141	*
2003	Baptist Hospital, Inc.	32501	552
2003	Saint Luke's Health System	64111	582
2004	Robert Wood Johnson University Hospital Hamilton	08690	200
2005	Bronson Methodist Hospital	49007	343
2006	North Mississippi Medical Center	38801	650
2007	Mercy Health System	53548	240
2007	Sharp HealthCare	92123	1870
2008	Poudre Valley Health System	80528	281
2009	AtlantiCare	08240	589
2009	Heartland Health	62959	353
2010	Advocate Good Samaritan Hospital	60515	333
2011	Henry Ford Health System	48202	802
2011	Schneck Medical Center	47274	95
2011	Southcentral Foundation	99508	150
2012	North Mississippi Health Services	38801	643
2013	Sutter Davis Hospital	95616	48
2014	Hill Country Memorial	78624	86
2014	St. David’s HealthCare	78705	414

Year	Health Care Winner	Zipcode	# beds
2015	Charleston Area Medical Center Health System	25304	424
2016	Kindred Nursing and Rehabilitation–Mountain Valley	83837	68
2016	Memorial Hermann Sugar Land Hospital	77479	149
2017	Adventist Health Castle	96734	160
2017	Southcentral Foundation	99508	150
2018	Memorial Hospital and Health Care Center	47546	137
2019	Adventist Health White Memorial	90033	353
2019	Mary Greeley Medical Center	50010	220

*: Large system, no dominated hospital.

Secondly, researchers collected survey data from the HCAHPS survey with ten measures. Prior studies used two methods to collect survey data to analyze the characteristics of Baldrige Award recipients. Some scholars design the survey and invited participants to the target party (Flynn and Saladin, 2001; Meyer and Collier, 2001). Others use secondary data to compare the award winners with competitors (Schulingkamp and Latham, 2015). In this paper, researchers use HCAHPS survey data because it is standardized and easy to use. The HCAHPS survey is one of several national initiatives focused on patients' perspectives of hospital care (Giordano et al., 2010). It is standardized, public, and updated quarterly. CMS requires all hospitals in the U.S. to take part in the survey. If a discharged patient wants to participate in the study, he or she can use mail, telephone, mixed, or active interactive voice recognition to answer a list of 29 questions. These questions relate to their recent hospital experience. The HCAHPS questionnaire has three topics: Composite topics, Individual topics, and Global topics (CMS, 2019). Composite topics include six items, individual topics include two questions, and global topics have two questions. Because CMS provides the survey results publicly on the Internet, the hospital needs to get a good HCAHPS score to keep the reputation and get potential government financial support.

Ten items were selected from the HCAHPS survey to measure patient satisfaction. Six composites measure the communication between the hospital and patients; two individual composites weigh the cleanliness and quietness of the ward; two global composites estimate patients' overall rating and intention to recommend the hospital. Because HCAHPS records the proportion of patients who meet the required score, the range of the data is from 0 to 100. Table 8 shows the measures used by CMS in the HCAHPS survey for patient experience (CMS, 2019). According to the table, when comparing the scoring average between the award winners and the national average, award winners perform better in all measures except the cleanliness of the room and the bathroom. Therefore, researchers believe the efficacy of Baldrige in improving the quality of hospital services.

Table 8: HCAHPS Survey for the Patient Experience

Measure ID	HCAHPS Measures	Award Winners	National Average
Composite topics			
H-COMP-1	Patients who gave their hospital a rating of 9 or 10 on a scale from 0 (lowest) to 10 (highest).	74.500 (9.354)	69.714 (1.666)
H-COMP-2	Patients who reported that their doctors "Always" communicated well.	81.500 (4.829)	81.143 (0.833)
H-COMP-3	Patients who reported that their nurses "Always" communicated well.	79.800 (5.474)	78.000 (1.414)
H-COMP-4	Patients who reported that they "Always" received help as soon as they wanted.	67.700 (6.523)	66.571 (1.841)
H-COMP-5	Patients who reported that staff "Always" explained about medicines before giving it to them.	65.400 (4.714)	63.143 (1.807)
H-COMP-6	Patients who reported that their pain was "Always" well controlled.	72.900 (3.848)	70.286 (0.881)
Individual topics			
H-CLEAN-HSP	Patients who reported that the area around their room was "Always" quiet at night.	60.900 (9.867)	60.143 (1.552)
H-QUIET-HSP	Patients who reported that their room and bathroom were "Always" clean.	72.800 (7.145)	73.000 (1.069)

Measure ID	HCAHPS Measures	Award Winners	National Average
Global topics			
H-HSP-RATING	Patients who reported that YES, they were given information about what to do during their recovery at home.	85.200 (2.948)	84.429 (2.060)
H-RECMND	Patients who reported YES, they would recommend the hospital.	77.000 (7.977)	70.571 (0.904)

Note: Data are given as percentages for the mean and standard deviation.

2.4.2 3.4.2 Control Parties Selection

In this study, researchers set three subjects as the control parties. Party 1 is the matching hospitals in the geographic markets. Researchers followed two rules to select matching hospitals. Firstly, researchers will try to find any matching hospitals or competitors mentioned in the award winner's MBNQA application. If the award winner does not indicate or give the name of its competitors, researchers will find the matching hospitals in the geographic markets with a similar number of beds. Party 2 is the state average HCAHPS score. Party 3 is the national average HCAHPS score. The data for these two control parties could be collected from the HCAHPS survey database. Control parties' HCAHPS scores have a similar format as award winners' scores. They measure the proportion of survey participants as the ratio data ranging from 0 to 100. Three topics with a total of ten measures were collected for the comparison purpose.

2.4.3 3.4.3 Measures and Calculation

Researchers examined the aspects of patients' satisfaction. Specifically, we analyzed patient satisfaction from the award winners and their matching competitors, the state average, and the national average patient satisfaction. For each of these measures, researchers calculated the percentage difference in patient satisfaction between the winner and control parties over 5-year time intervals (Zhang and Xia, 2013).

Following the previous research (Zhang and Xia, 2013), the calculation formula is given as $\frac{(PSS_t - PSS_{t-i})}{PSS_{t-i}} - \frac{(PSC_t - PSC_{t-i})}{PSC_{t-i}}$. Within this equation, year *t* is the year the award winner received the MBNQA. PSS_t measures the patient satisfaction of sample hospital (the Baldrige winner) in year *t*, and PSC_t measures the patient satisfaction of the control party in year *t*. Meanwhile, PSS_{t-i} measures the patient satisfaction of sample hospital in year *t-i*, and PSC_{t-i} measures the patient satisfaction of the control party in year *t-i*.

Researchers calculated the mean and estimated median for each patient satisfaction measure. This study applied a t-test as the parametric test to determine if there is a significant change in the mean values. To measure the change of the estimated median, we used the Wilcoxon signed-rank (WSR) test in the study.

2.4.4 Data Collection

This study collected data from the HCAHPS survey database to compare the patient satisfaction of Baldrige Award-winning hospitals with matching hospitals, state average, and national average.

Table 9: Summary of the Baldrige Award Winners in the Health Care Sector

Yr	Healthcare Winner	Provider #	Zip code	Beds #	PS -2	PS -1	PS 0	PS +1	PS +2
2010	Advocate Good Samaritan Hospital	140288	60515	333	68.5	69.8	72.5	73.0	73.8
2011	Henry Ford Health System	230053	48202	802	70.5	71.0	71.7	71.5	70.8
2011	Schneck Medical Center	150065	47274	95	77.2	78.0	76.8	79.3	80.7
2011	Southcentral Foundation	020026	99508	150	65.8	66.5	67.2	72.2	71.2
2012	North Mississippi Health Services	250004	38801	643	77.2	78.3	79.5	79.3	79.7
2013	Sutter Davis Hospital	050537	95616	48	73.7	77.0	79.8	80.7	77.2
2014	Hill Country Memorial	450604	78624	86	82.2	83.5	84.0	85.0	84.5

Yr	Healthcare Winner	Provider #	Zip code	Beds #	PS -2	PS -1	PS 0	PS +1	PS +2
2014	St. David's HealthCare	450431	78705	414	75.0	75.5	76.3	76.8	77.7
2015	Charleston Area Medical Center Health System	510022	25304	424	69.8	71.3	72.5	72.2	72.0
2016	Memorial Hermann Sugar Land Hospital	450848	77479	149	71.3	73.7	73.8	72.3	73.3

Note: PS=patient satisfaction

Table 9 summarizes the Baldrige Award winners in the healthcare sector from 2010 to 2016. Each hospital or healthcare organization has a unique provider number, which could be used to find the object in the HCAHPS database. Researchers recorded the number of beds for all the healthcare organizations as the criterion of hospital size. Moreover, we record the zip code to select the matching competitors and the state average patient experience scores. In total, the table includes five years score for all award winners. The study set the year that the healthcare organization received the Baldrige Award as the first year, PS 0. Researchers collected data two years before the award winner received the award as PS -2 and PS -1, and two years after the award as PS +1 and PS +2.

2.5 Results

To provide a comprehensive understanding of the comparison between the award winners and control parties, we calculated the mean and estimated median for three topics: Composite topics, Individual topics, and Global topics. Both parametric and non-parametric testing results are reported. For the parametric test, this study used the t-test to measure whether the mean change in difference is significantly greater than zero. For the non-parametric test, researchers used the WSR test to measure whether the median change in difference is significantly higher than zero. The results of all analyses are based on the one-tailed test.

Table 10 shows the mean and estimated median percentage changes between the award winners and matching hospitals. For each topic, we separated differences into two panels. Panel

A analyzed the annual variation in the percentage change from -2 to +2. Panel B analyzed the two- and three-years long term intervals. According to Table 10, in the individual topics, the difference between the year +1 and -2 and shows the statistically significant and positive changes between the mean (p = 0.045) and estimated median (p = 0.038). However, in the composite topics and global topics, the median and control-adjusted mean changes are not statistically significant.

Table 10: Adjusted Percentage Changes with Matching Hospitals as Control Party

	Composite Topics			Individual Topics			Global Topics		
	#	Mean	Median	#	Mean	Median	#	Mean	Median
Changes on the Annual Basis									
Dif -1 -2	8	0.001	0.005	8	0.010	0.035	8	0.009	0.027
Dif 0 -1	8	-0.011	-0.008	8	0.020	0.021	8	-0.020	-0.017
Dif +1 0	8	0.008	0.010	8	0.011	0.012	8	0.016	0.002
Dif +2 +1	8	-0.023	-0.020	8	-0.006	0.005	8	-0.021	-0.017
Changes on Long-term Intervals									
Dif 0 -2	8	-0.010	-0.011	8	0.030	0.037	8	-0.011	0.010
Dif +1 -1	8	-0.004	-0.003	8	0.032	0.015	8	-0.003	-0.009
Dif +2 0	8	-0.015	-0.013	8	0.007	0.014	8	-0.004	-0.011
Dif +1 -2	8	-0.002	-0.002	8	0.042**	0.048**	8	0.006	0.009
Dif +2 -1	8	-0.028	-0.027	8	0.027	0.026	8	-0.025	-0.028

Note: *, **, *** denote the statistical significance at 1%, 5%, and 10%

Table 11 shows the mean and estimated median percentage changes between the award winners and the state average. There are three topics and two panels. Researchers analyzed the changes on both the annual basis and long-term intervals. According to the Table 11, the mean control-adjusted change is statistically significant and positive in three intervals: -1 and -2 (p = 0.028), 0 and -2 (p = 0.062), and +1 and -2 (p = 0.062). The estimated median control-adjusted changes are positive and statistically significant in the same years: -1 and -2 (p = 0.026), 0 and -2 (p = 0.051), and +1 and -2 (p = 0.063). For individual and global topics, there are no positive and statistically significant years.

Table 11: Adjusted Percentage Changes with State Average as Control Party

	Composite Topics			Individual Topics			Global Topics		
	#	Mean	Median	#	Mean	Median	#	Mean	Median
Changes on the Annual Basis									
Dif -1 -2	10	0.009**	0.008**	10	0.009	0.015	10	0.005	0.007
Dif 0 -1	10	0.004	0.003	10	0.012	0.014	10	-0.004	-0.001
Dif +1 0	10	0.001	-0.001	10	-0.005	-0.009	10	0.003	-0.012
Dif +2 +1	10	-0.009	-0.010	10	0.000	0.000	10	-0.008	-0.008
Changes on Long-term Intervals									
Dif 0 -2	10	0.013*	0.013*	10	0.021	0.019	10	0.001	0.001
Dif +1 -1	10	0.005	0.004	10	0.007	0.006	10	-0.002	-0.013
Dif +2 0	10	-0.008	-0.008	10	-0.005	-0.010	10	-0.006	-0.013
Dif +1 -2	10	0.014*	0.014*	10	0.015	0.011	10	0.003	0.001
Dif +2 -1	10	-0.005	-0.005	10	0.007	0.008	10	-0.010	-0.017

Note: *, **, *** denote the statistical significance at 1%, 5%, and 10%

Table 12: Adjusted Percentage Changes with U.S. National Average as Control Party

	Composite Topics			Individual Topics			Global Topics		
	#	Mean	Median	#	Mean	Median	#	Mean	Median
Changes on the Annual Basis									
Dif -1 -2	10	0.008**	0.008*	10	0.006	0.018*	10	0.005	0.005
Dif 0 -1	10	0.004	0.004	10	0.012	0.010	10	-0.005	-0.004
Dif +1 0	10	0.001	-0.001	10	-0.006	-0.006	10	0.006	-0.007
Dif +2 +1	10	-0.010	-0.008	10	0.002	0.003	10	-0.006	-0.008
Changes on Long-term Intervals									
Dif 0 -2	10	0.012*	0.013*	10	0.018	0.016	10	0.000	0.002
Dif +1 -1	10	0.005	0.004	10	0.006	0.001	10	0.001	-0.011
Dif +2 0	10	-0.009	-0.009	10	-0.004	-0.005	10	0.000	-0.009
Dif +1 -2	10	0.013*	0.011	10	0.011	0.001	10	0.005	0.002
Dif +2 -1	10	-0.005	-0.004	10	0.008	0.010	10	-0.006	-0.016

Note: *, **, *** denote the statistical significance at 1%, 5%, and 10%

Table 12 shows the results of the analysis between the award winners and the U.S. national average. In the composite topics, results for the percentage changes in mean are statistically significant and positive in three intervals: -1 and -2 ($p = 0.05$), 0 and -2 ($p = 0.069$),

and +1 and -2 (p = 0.091). The median control adjusted changes are positive and statistically significant in two intervals: -1 and -2 (p = 0.051), and 0 and -2 (p = 0.093). For individual topics, the median change is significant in the interval between the year -1 and -2 (p = 0.051). For global topics, there is no statistically significant change in either mean or median.

Overall, research results indicate that at certain stages, Baldrige Award winners have better patient satisfaction than control parties. When we compare the percentage changes in three topics, award winners have better performance in the composite topics than matching objects. When we compare the percentage changes with different control parties, award winners performed better than the state average and U.S. national average. When we focus on the time intervals, award winners show the performance improvement before they receive the MBNQA. For example, in composite topics and individual topics, there is a significant improvement between the year -2 and other years.

2.6 Contributions and Limitations

2.6.1 Discussion

This study focuses on evaluating patient satisfaction of Baldrige Award recipients in the healthcare sector. Researchers compared the award winner's patient satisfaction with control parties, including the matching hospitals, state average, and national average. Patient satisfaction data were collected from the HCAHPS survey. The event study methodology was applied to analyze the difference between the award winners and control parties based on the mean and estimated median control adjusted percentage changes in the five years. The study believes that award recipients have better performance than the control parties in patient experience. Research results support the effectiveness of the Baldrige Excellence Framework in improving healthcare organizations' patient satisfaction.

The hypotheses focused on the comparison between the Baldrige Award-winner with the performance of matching hospital (H1), state average (H2), and the national average (H3).

According to Table 10, there is a significant difference between the year -2 and +1 in individual topics. There are two questions in the individual topics, which measure the cleanliness and quietness of the hospital environment. Thus, award winners performed better than their matching hospitals in the hospital environment after they received the MBNQA. For hypothesis 2, Table 11 shows that when compared with state average patient satisfaction scores, award winners performed better in composite topics. The composite topics use six items to measure the communication and care transition between the nurse, doctor, staff, and patients. Specifically, the percentage changes between the year -2 and other years show positive and statistically significant differences. Therefore, award winners provide better patient communication than the state average. Finally, this study compared the difference between the award winners with national performance. According to Table 12, award winners supply better patient communication and hospital environment than the national average. The differences between two years before they received the award and other years are positive and statistically significant. In summary, we believe winning the Baldrige Award will help the hospital achieve better patient satisfaction than control parties.

2.6.2 Implications for Practice and Theory

The results support the Baldrige Excellence Framework as a practical framework for improving patient experience in the communication and hospital environment. Baldrige provides a category, customers, inside of the leadership triad to help healthcare organizations identify their strengths and opportunities to get sustainable quality management improvement. For example, the Customers category in the Baldrige Health Care Criteria for Performance Excellence asks healthcare organizations the questions, “How do you listen to, satisfy, and engage your patients and other customers?” (NIST, 2019). Organizations need to follow the guideline to answer this question and evaluate their operation process from four dimensions: approach, deployment, learning, and integration. This study shows that using the Baldrige

Excellence Framework can increase patient satisfaction, which supports prior studies (Meyer and Collier, 2001; Schulingkamp and Latham, 2015).

This study supplies empirical evidence on Baldrige's impact on healthcare organizations' performance. We analyzed the relationship between the effective quality management framework and organization performance with the event study. This study confirms previous studies' research results (Hendricks and Singha, 1997; Zhang and Xia, 2013). The research results indicate that organizations will experience significant improvement in specific periods. The difference between this research and prior studies is that our results show that award-winning healthcare organizations not only performed better than matching hospitals but also performed better than the state average and national average.

2.6.3 Limitations

The main limitation of this study is the lack of sample data. The fist MBNQA was given to the healthcare organization in 2002. Until 2019, there are 27 award recipients in the health care sector. Moreover, this study includes Baldrige award winners from 2010 to 2016 because the HCAHPS survey data was released in 2008. This research compared the award winners with control parties with five years. As a result, the sample size is limited. Future research should consider alternative database for analyzing the patient experience and satisfaction related to the perspectives of hospital care.

Moreover, the changes in the HCAHPS survey limited the number of items included in this study. The early version of the HCAHPS survey had seven items in the composite topics. However, CMS recently removed the item "Patients who "Strongly Agree" that they understood their care when they left the hospital." Thus, future research could consider a suitable statistical method to analyze the content of this removed item.

2.7 Conclusions

This study investigated the patient satisfaction of Baldrige Award recipients in the healthcare sector. Researchers compared the award winners' patient satisfaction with control parties, including the matching hospitals, state average, and national average. Five years of data were collected from the HCAHPS survey. Researchers used the event study method to evaluate the difference between the award winners and control parties based on the mean and estimated median control adjusted percentage changes. Both the t-test and WSR tests are reported in this study. According to the research results, award winners show the performance improvement before they receive the MBNQA. In composite topics and individual topics, there is a significant improvement between the year -2 and other years. We believe that the Baldrige Award winners perform better than the control parties in patient experience. As a result, the Baldrige Excellence Framework effectively helps healthcare organizations to improve patient satisfaction and quality management performance.

ESSAY 3

DETERMINANTS OF TRUST IN HEALTH INFORMATION TECHNOLOGY: AN EMPIRICAL INVESTIGATION IN THE CONTEXT OF AN ONLINE CLINIC APPOINTMENT SYSTEM*

3.1 Introduction

The use of health information technology (HIT) in the United States is not a novelty anymore. Since 2009, HIT applications have become increasingly important to the government's economic stimulus package. Academics in healthcare research conduct focused studies on the use of HIT (Abraham & Junglas, 2011; Hoyt, Adler, Ziesemer, & Palombo, 2013; Kaplan & Harris-Salamone, 2009; Klein & Wareham, 2008; Leidner, Preston, & Chen, 2010). As it has in other industries, information technology has resulted in positive changes in healthcare industry operations. HIT fosters safe and confidential delivery of health information to patients, improves the efficiency of the exchange of information between the physician and patient, enhances the quality of care, and reduces operational costs (Ball & Lillis, 2001; Devaraj, Ow, & Kohli, 2013; Shekelle, Morton, & Keeler, 2006; Sherer, 2014). The benefits of HIT have prompted its inclusion in the Baldrige Award criteria in the health care category. All Baldrige award recipients in the health care category, from 2002 to 2018, effectively used HIT to improve their operations and enhance patient satisfaction (National Institute of Standards and Technology (NIST), 2019).

Among all HIT applications, web-based medical appointment systems (OCAS) are a significant research topic because scheduling a medical appointment typically initiates most non-urgent healthcare services (Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017). The use of an

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online clinic appointment system (OCAS) can reduce a health care organization's no-show rate, decrease operational costs, shorten wait times, and improve patient satisfaction (Camacho, Anderson, Safrit, Jones, & Hoffmann, 2006; Denizard-Thompson, Feiereisel, Stevens, Miller, & Wofford, 2011; Parmar, Large, Madden, & Das, 2009; Zhao et al., 2017). Patient satisfaction is essential to healthcare organizations because service quality is an increasingly important aspect of patient satisfaction. Patient satisfaction with a medical appointment system is affected by the patient's ability to schedule an appointment with their preferred physician at a time most convenient to the patient (Mitropoulos, Vasileiou, & Mitropoulos, 2018; Wang & Gupta, 2011). An OCAS improves the scheduling process because a web-based system supplies real-time information to allow patients to schedule with their preferred doctor at a convenient time (Payton, Pare, Le Rouge, & Reddy, 2011). The improved information exchange enhances provider-patient communication and improves the social relationship that further eases the information exchange process (Dobrzykowski & Tarafdar, 2015). Moreover, an OCAS can allow patients to complete medical documentation in advance of the visit, view their treatment histories, and gives patients a greater ability to assume responsibility for their own health.

Most studies on online medical appointment systems focus on their associated benefits and barriers. There is a lack of research analyzing the acceptance mechanism from a patient's trust perspective. Earlier studies claim that trust issues exist when users consider adopting new technology (Hillman & Neustaedter, 2017; Li, Hess, & Valacich, 2008; Malaquias & Hwang, 2017), and this challenge also exists when patients first consider using an OCAS to schedule their medical appointments. Our research goal is to evaluate the acceptance mechanism of an OCAS from the patients' point of view in order to provide a greater understanding of the patient's trust formation process with an OCAS in the healthcare industry.

In this study, we develop an enhanced trust model based on prior trust formation studies (Li et al., 2008; McKnight, Choudhury, & Kacmar, 2002a). The model is composed of

three components of trust: institutional factors, personal factors, and a technical factor. This study contributes to the body of knowledge on the mechanism of trust formation by proposing and evaluating a comprehensive set of constructs that contribute to patients' trust in an OCAS. Compared to earlier studies, our model includes two new constructs: perceived ease of use and self-efficacy. The results generate many insights for trust theory development in technology acceptance research.

This study contributes to healthcare management practice by showing the patient process of trust formation in an OCAS. To promote the acceptance of this service, healthcare organizations must commit to first earning patients' trust. This study suggests that a positive provider reputation and a well-designed OCAS can motivate patients to trust and can create the intention to use the system. To strengthen patients' trust, healthcare organizations must focus on building a good reputation. When patients believe the clinic is standing with them, trusting beliefs related to using the clinic's OCAS will increase. Moreover, patients also develop trust that the OCAS will be easy to use.

The organization of this paper is as follows. The next section reviews the related literature, theoretical foundation, and hypothesis development. Subsequently, we describe the design of the survey instrument and data collection in Section 4.3 and report the data analysis and results in Section 4.4. We discuss the contributions, limitations, and future research in Sections 4.5, 4.6 and 4.7, respectively. Finally, Section 4.8 concludes the paper.

3.2 Literature Review and Model Development

3.2.1 Trust in Technology

Trust and technology acceptance. Earlier studies have confirmed the importance of integrating trust in technology acceptance research. For example, the technology acceptance model (TAM) (Davis, 1985) is a theoretical model analyzing individual technology acceptance of computer-based information systems. Gefen, Karahanna, and Straub (2003) analyzed the

relevance of trust to the TAM and pointed out that trust is as important as other constructs in online shopping. After that, researchers studied the relationship between trust and TAM. For example, Benbasat and Wang (2005) evaluated the integrated Trust-TAM model and confirmed the nomological validity of trust in online recommendation systems. Later, Tung, Chang, and Chou (2008) demonstrated that the hybrid trust and TAM model could predict technology acceptance in the medical industry. Egea and González (2011) used trust, the TAM, and risk factors to explain physicians' acceptance of a type of HIT. Kim (2012) analyzed the consumer's first purchase intention with the integrated model of initial trust and TAM. He believed that there is a time buffer between trust and purchase intention.

The unified theory of acceptance and use of technology (UTAUT) is another widely used model analyzing individual technology acceptance (Venkatesh, Morris, Davis, & Davis, 2003). The relationship between trust and UTAUT was unclear until the recent decade. Komiak and Benbasat (2006) pointed out that technology acceptance models, like UTAUT, do not pay enough attention to trust. Subsequently, Casey and Wilson-Evered (2012) analyzed technology innovation in online services by using the extended UTAUT model with trust and personal web innovativeness. According to their research, the effects of trust are mediated by the UTAUT constructs. Recently, Oliveira, Faria, Thomas, and Popovič (2014) proposed an integrated UTAUT model with an initial trust and task-technology fit model. Within this integrated model, initial trust shows a statistically significant positive influence on behavioral intention. Chaouali, Yahia, and Souiden (2016) confirmed this relationship and claimed that trust has both a direct and indirect impact on behavioral intention.

Trust and health information technology. Although previous IS research demonstrated that trust could influence individual technology acceptance, there is a particular need to understand the impact of trust in HIT utilization. On the one hand, barriers between the provider, patients, and HIT can block the adoption of new technology (Buntin, Burke, Hoaglin, &

Blumenthal, 2011), as can patient and physician concerns about the privacy and security of HIT (Blumenthal, 2009). On the other hand, trust in different situations is formed based on factors that can be influenced by situational changes. For example, McKnight, Cummings, and Chervany (1998) said that four constructs fostered initial trust in an organizational relationship, including personality, institutional, calculative, and cognitive constructs. To measure the user's trust toward a web-based vendor, McKnight, Choudhury, and Kacmar (2002b) applied two sets of antecedent factors and two vendor-specific factors. Correspondingly, Zahedi and Song (2008) analyzed trust formation toward health infomediaries by synthesizing social behavior, economics, and personal perspectives of consumer actions. Compared to many types of information technology systems, HIT is special because of the amount of personally sensitive information that the system potentially stores and manages. The process of trust formation in HIT is different from that of many types of information technologies. Thus, this study considers the determinations of trust in HIT as a separate and unique topic compared with other information technology acceptance topics.

3.2.2 Trust Formation in HIT

Social trust research in psychology posits that trust can be viewed as the truster's attitude toward the trustee (Spector & Jones, 2004). In management, trust can be defined as the willingness of the truster to be vulnerable to the actions of the trustee based on the expectation of their future behaviors (Mayer, Davis, & Schoorman, 1995). This study focuses on an individual's trust in HIT where we use OCAS as a proxy. We classified patients, the trusters, as the service users who grant trust to an OCAS implemented by a healthcare organization, the trustee, as the service provider.

It is valuable to analyze the mechanism of trust formation when users try new information technologies (Gefen et al., 2003; McKnight et al., 2002a). As Reichheld and Schefter (2000) said, "Price does not rule the Web; trust does." On the one hand, trust between

patients and an OCAS will influence technology acceptance. Trust plays a vital role in adopting online health information technology (Mou, Shin, & Cohen, 2017). On the other hand, a strong trusting relationship between the user and service provider will directly increase technology acceptance (Gefen et al., 2003). Trust plays a key role in the customer-supplier relationship and positively affects value creation (Ryssel, Ritter, & Georg Gemnden, 2004). We contend that in this study we are measuring trust in the OCAS versus the provider for two reasons. First, the subjects were asked about the OCAS directly, so they could specifically respond about the technology independent of their provider. Second, most subjects were young health respondents who typically obtain less critical health care services from the provider when making appointments. It is unreasonable to expect any respondent to use an online system in a true emergency that requires an ER visit. Thus, this study will analyze trust in OCAS in the context of a non-emergency healthcare provider.

3.2.3 Why Do People Trust

Why do people trust? Psychology researchers claimed that people's willingness to trust is based on their estimates of the probability that others will reciprocate that cooperation (Kramer & Tyler, 1996). To interpret this willingness, it is important to understand that trust is not only an expression of an internal and unvarying personality trait but also a response of individuals to the related external environment (Newton, 2001). Therefore, researchers suggested that multiple categories of psychological factors should be considered when analyzing individual's trust in information technology adoption (Chen & Rau, 2014; Sharif, Shao, Xiao, & Saif, 2014; Sillence & Briggs, 2007). Prior research shows that two factors influence patients' trust. The first factor is information. Information positively influences the patients' trusting intention. If patients have all of the necessary information, their level of trust will increase (Asan, Flynn, Azam, & Scanlon, 2017). Meanwhile, when users lack direct experience with certain information technologies, their trust will depend on the information

they receive (Zhang & Gu, 2015). In information technology, users get what they consider credible information when engaging in trust-related behaviors and assessing the "trustworthiness" of the provider through observation of provider behavior and its consequences (McKnight & Chervany, 2006; McKnight et al., 2002a).

The second factor is the perceived risk. Perceived risk negatively influences patient trust. Trust research in psychology suggests that uncertainty and risk will influence trust (Cook, 2005). Information technology users must overcome perceived risk and uncertainty before adopting the new technology (Beldad & Hegner, 2017; Benbasat & Wang, 2005; McKnight et al., 2002b). Earlier research found that users demonstrate trusting intention to use information technology based on the assumption that the service provider is ethical and behaves in a socially responsible manner, leading them to trust the service provider (Gefen, 2000). Thus, if patients cannot trust the service provider, they will avoid using the OCAS.

Trust is a vast and complex concept that has been studied in many applications and subject areas (Li et al., 2008). In this study, we focus on understanding trust formation in HIT while using OCAS as a proxy for HIT. According to prior research in trust and information technology (Li et al., 2008; McKnight et al., 2002a; Montoya-Weiss, Voss, & Grewal, 2003), this study assumes patients' trust is influenced by three types of factors, including institutional, personal, and technical. Institutional factors measure the influence of the healthcare organization. Personal factors measure the influence of patients as individuals. A technical factor measures the influence of the OCAS. Investigating patients' trust in OCAS helps researchers and providers understand the determinants of trust in HIT. At the same time, the study can help healthcare organizations understand how to improve patients' utilization while developing and implementing an OCAS or HIT.

3.2.4 Trusting Bases

To investigate patients' trust formation, this paper develops an enhanced trust model

based on previous research in trust and technology acceptance. As shown in Figure 1, our research model includes nine constructs. We use trusting beliefs and trusting intentions to measure patients' trust in technology acceptance. We assume six trusting base constructs that will positively affect trusting beliefs. Meanwhile, the subjective norm should have a positive influence on both trusting beliefs and trusting intention. Compared to previous research (Li et al., 2008; McKnight et al., 2002a; Montoya-Weiss et al., 2003), this paper adds two new constructs: perceived ease of use and self-efficacy. These two constructs offer strong insights into trust formation in HIT.

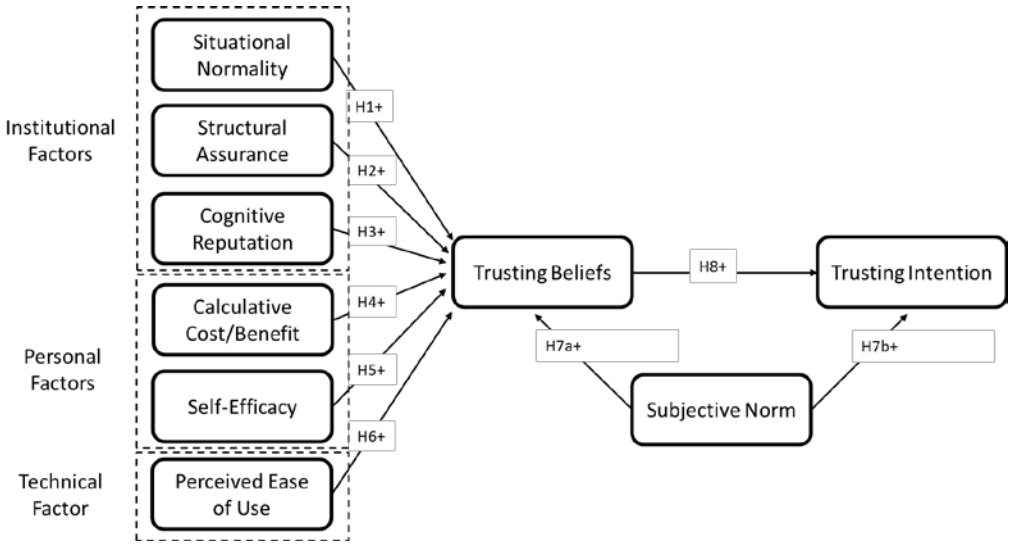

Figure 4: The Enhanced Trust Model

To provide a comprehensive understanding of the formation of trusting beliefs, we detail six trusting base constructs with three components: institutional factors, personal factors, and a technical factor. Institutional factors include situational normality, structural assurance, and cognitive reputation. Personal factors include calculative cost/benefit and self-efficacy. Technical factor is measured by perceived ease of use. Next, we review all constructs and develop our research hypotheses.

3.2.4.1 Institutional Factors

Institutional factors include situational normality, structural assurance, and cognitive

reputation. This component measures the belief of specific structural conditions that are present on the Internet to achieve a successful outcome (McKnight et al., 2002a). Situational normality is the perception that results from the typical state of the environment. In this study, we follow McKnight et al.'s (2002a) classification and evaluate situational normality beliefs with three attributes: competence, benevolence, and integrity. The relationship between situational normality and trusting beliefs should be positive. Institution-based trust creates a trustworthy environment in the consumer's mind and increases the level of the consumers' trusting beliefs (Zucker, 1986). Patients, as the consumers, have confidence that the environment on the Internet is trustworthy, and that it is safe to use the OCAS if they perceive high situational normality (McKnight et al., 2002a).

Structural assurance means that beliefs result from structures like the policies, laws, and guarantees that are in place. Patients tend to trust an unknown product based on reliable structural assurance and situational normality when the information upon which to infer trustworthiness is lacking. Hence, we propose the following hypotheses:

H1. Situational normality is positively correlated with trusting beliefs.

H2. Structural assurance is positively correlated with trusting beliefs.

Cognitive reputation measures the degree of cognitive familiarity that the trustor has about the trustee (Li et al., 2008). The degree of cognitive familiarity with the trustee has a positive influence on the development of trusting beliefs (Gefen, 2000). When service users lack direct information or experiential interaction with the information technology service, they will try to establish a cognitive familiarity with the unknown service based on related secondary information (Gefen, 2000; Li et al., 2008). Goodwill trust has a strong influence on consumers' dependency on the B2C relationship (Fatima & Di Mascio, 2018). In this study, we hypothesize that positive reports and feedback about the OCAS will enhance patients' trusting beliefs related to technology acceptance.

H3. Cognitive reputation is positively correlated with trusting beliefs.

3.2.4.2 Personal Factors

Personal factors include calculative cost/benefit and self-efficacy. Two constructs measure different aspects of personal incentives. Calculative cost/benefit evaluates the personal trust related to an OCAS and the healthcare organization. Self-efficacy considers the personal trusting bases related to individual perceived ability.

Calculative cost/benefit measures the level of patients' trust in their ability to protect their benefits (Li et al., 2008). This construct assumes that rational individuals will act in their own interest in making the decision to trust (Berg, Dickhaut, & McCabe, 1995; Lewicki & Bunker, 1995; Williamson, 1993). Calculative trust is applied in both volitional and nonvolitional applications, such as the use of a website (Gefen et al., 2003; Li et al., 2008). When developing a calculative trust evaluation, patients make a judgment about whether the OCAS and healthcare organizations are worthy of their trust. Patients will consider the potential costs or benefits for improper use of the OCAS, such as the risk to their personal and private medical information. Hence, patients tend to trust when they believe that an OCAS or healthcare organization has nothing to gain from being untrustworthy. In other words, if patients believe that an OCAS and the healthcare organization has nothing to gain from collecting and retaining their sensitive medical information, they are more likely to trust and use the OCAS.

H4. Calculative cost/benefit is positively correlated with trusting beliefs.

Self-efficacy reflects the individual's perceived ability to perform an activity and to achieve the expected outcome (Marakas, Johnson, & Clay, 2007; Zhou, 2012). In this research, we define self-efficacy as the patients' perception that they have enough knowledge and skill to use the OCAS. Self-efficacy measures impact factors related to patients themselves. Bandura (1997) believed that people with high self-efficacy show strong positive expectations for the

outcome. Thus, we hypothesize that self-efficacy will positively affect patients' trusting beliefs in an OCAS.

H5. Self-efficacy is positively correlated with trusting beliefs.

3.2.4.3 Technical Factor

This study uses perceived ease of use as the technical factor to measure the influence of information technology. According to the prior study, perceived ease of use is measured by three attributes: perceived ease of use, graphics style perceptions, and navigational structure perceptions (Benbasat & Wang, 2005; Montoya-Weiss et al., 2003).

On the one hand, perceived ease of use is the degree to which an individual expects that the use of technology will be free of effort (Venkatesh, 2000). If patients find the OCAS well-designed and easy to use, they tend to have confidence in the provider. Prior research on technology acceptance shows that perceived ease of use is positively correlated with trusting beliefs and trusting intention (Montoya-Weiss et al., 2003; Shen & Chiou, 2010; Venkatesh & Davis, 2000). On the other hand, perceived ease of use confirms to the user that the service provider is committed to a user-friendly and secure system design, which is reflected in graphics and the navigational structure (Benbasat & Wang, 2005; Montoya-Weiss et al., 2003). Therefore, we assume perceived ease of use will positively affect patients' trusting beliefs.

H6. Perceived ease of use is positively correlated with trusting beliefs.

3.2.4.4 Subjective Norm

Subjective norm measures the patients' perception that their relatives and friends support their engagement in a specific behavior (Ajzen & Fishbein, 1980; Li et al., 2008). Social reference groups can affect people's trusting beliefs through internalization and compliance (Bagozzi, 2007; Kelman, 1958). This is when one's referent beliefs transfer to another person and are internalized (Li et al., 2008). People will follow important referents and

trust an unfamiliar information technology, and as a result, also develop a trusting intention to use it (Venkatesh & Davis, 2000). This study follows previous research and assumes there is a positive relationship between subjective norm and trusting beliefs (Li et al., 2008).

H7a. Subjective norm is positively correlated with trusting beliefs.

Moreover, the subjective norm should have a positive influence on trusting intention. This relationship is based on compliance theory that assumes the user is sufficiently motivated by important information to decide (Kelman, 1958; Li et al., 2008). For example, if patients want to use an OCAS they are not familiar with, they will ask their family members and dependable friends for opinions. We propose that subjective norm has both direct and indirect positive influences on trusting intention.

H7b. Subjective norm is positively correlated with trusting intention.

3.2.4.5 Trusting Beliefs and Trusting Intention

This research uses trusting beliefs and trusting intention as two inter-related constructs to represent patients' trust in technology acceptance (McKnight et al., 2002a). Trusting beliefs reflect the user's perception of the organization's trustworthiness (McKnight et al., 2002b). This study follows previous research and uses three attributes to measure trusting beliefs (Li et al., 2008; McKnight et al., 2002a). Competence refers to the ability of the trustee to do what the trustor needs (McKnight et al., 2002a). Benevolence refers to the motivation of the trustee and is based on the level of altruism (Mayer et al., 1995; Warner-Søderholm et al., 2018). Integrity refers to the trustee's honesty and sincerity (McKnight et al., 2002a).

Trusting intention measures the willingness of users to depend on the object of their trust (Li et al., 2008; McKnight et al., 2002a). Patients will show the intention to adopt an OCAS only if they trust it. For example, the perception that an OCAS is secure will encourage patients to be more willing to adopt it. Moreover, if patients believe the OCAS is efficient and

helpful, they will feel more comfortable in providing sensitive medical information. Therefore, we propose that trusting beliefs have a positive correlation with trusting intention.

H8. Trusting beliefs are positively correlated with trusting intention.

3.3 Research Methodology

3.3.1 Survey Design

To assess the proposed research model, we contextualized validated survey items to assess constructs from prior research to fit our research context. Table 13 shows the operationalization of the constructs and corresponding sources. The survey instrument used a 5-point Likert scale (anchored with 1 = strongly disagree, 5 = strongly agree) for all the construct-related questions. The survey instrument used different scales for questions measuring previous experience and demographic information. Detailed survey items for constructs are presented in the appendix.

Table 13: Constructs and Operationalization

Construct	# Q	Sources
Situational normality	9	McKnight et al. (2002a) & Li et al. (2008)
Structural Assurance	5	McKnight et al. (2002a) & Li et al. (2008)
Cognitive Reputation	3	Li et al. (2008)
Calculative Cost / Benefit	3	Li et al. (2008)
Self-Efficacy	3	Zhou (2012).
Perceived Ease of Use	11	Benbasat and Wang (2005) & Montoya-Weiss et al. (2003)
Subjective Norm	3	Li et al. (2008)
Trusting Beliefs	12	Li et al. (2008)
Trusting Intention	6	Li et al. (2008) & McKnight et al. (2002a)

Although survey items were contextualized from validated items in previous research, researchers took three additional steps to maintain content validity. First, we invited five Ph.D. students in Information Systems, Management Science, and Logistics and Supply Chain Management with survey research experience to review the questionnaire. Second, we invited

three faculty members in Information Systems and Healthcare Operations Management with survey research experience to review the survey. After that, we improved the survey by incorporating their appropriate edits and suggestions. These feedback reviews were used to determine the minimum and maximum time required to complete the survey successfully.

3.3.2 Sample and Data Collection

We collected survey data to evaluate the research model. In this study, college students from a large public research university in the southwestern United States were invited to participate in the study. Researchers obtained IRB approval for the study prior to survey administration, and student participants received extra credit from their respective professors for voluntary participation. Despite the limitation on generalizability imposed, a student sample is considered appropriate when it constitutes a relevant sample (Ford & Ford, 2016; Nguyen, Ta, & Prybutok, 2019; Oakes, 1972; Schultz, 1969; Stevens, 2011). For the application used in this research, young people are familiar with information technology and show increased interest and experience in using many newer technologies (Chordas, 2001; Hordemann & Chao, 2012; Pempek, Yermolayeva, & Calvert, 2009; Vaterlaus, Frantz, & Robecker, 2019). Moreover, according to Table 14, young people show high participation in medical activities and online appointment systems. Participants who provide valuable responses are expected from the student sample in this information technology-related study because they constitute an important subset of the users of online appointment systems. Thus, a student sample is appropriate in the current research context.

3.3.3 Survey Administration

Prior to survey administration, all participants were required to sign informed consent. Each participant then followed the survey link provided via an invitation e-mail to enter the survey system. To facilitate an anonymous and honest response, participants provided their

name and student ID on a linked survey so that their identities were separated from their responses and their responses were assigned a code. Participants initially read a neutral description of an OCAS. Then they answered questions about their use of an OCAS in the last year. Respondents answered whether they had previous experience in using an OCAS or familiarity with other online appointment scheduling systems. When they did not have any previous experience, the survey system presented a brief descriptive video about an OCAS. Next, all participants answered questions specifically related to each construct in the research model. Finally, all participants provided demographic information.

3.4 Results

3.4.1 Data Analysis

We invited 600 undergraduates in four classes at a large public research university to take the survey. In total, 460 participants completed the survey successfully. Among them, 337 (73%) remained for analysis after data cleaning. We removed incomplete surveys or participants who completed the survey in less than the minimum time required based on pilot tests.

Table 14 shows the demographics of the study sample and the participants were well distributed across each category. In the past year, 76.6% of respondents had appointments with medical providers. To schedule their appointments, 68.6% of respondents scheduled appointments with a phone call, 20.2% had walk-in appointments, and only 7.8% used an OCAS. To better qualify the subjects and verify their technology utilization, we asked about their prior experience making online purchases such as airline tickets. According to the responses, 85.2% of participants had such experience. The data suggest that the use of OCAS is less frequent than other scheduling methods even though the campus health center and other clinics in the location of the study provide online medical appointment scheduling. As a result, these young people, as a group, show increased interest and experience in using online

appointment systems but had low usage of OCAS. These contradictory findings support the need to study the acceptance of OCAS from the patient's perspective further.

Table 14: Profile of Respondents

		Percent
Gender	Male	54.0
	Female	46.0
Age	18 – 20	41.5
	21 – 24	40.1
	25 – 34	15.7
	>35	2.7
Medical experience last year	Yes	76.6
	No	23.4
Method used last time	Phone call	68.6
	Walk-in	20.2
	Online scheduling	7.8
	Other	3.5
Experience with the online appointment system	Yes	85.2
	No	14.8

For non-response bias, we assessed the last 10% of responses as being representative of non-respondents (Karahanna, Straub, & Chervany, 1999; Ogara, Koh, & Prybutok, 2014; Pentina, Prybutok, & Zhang, 2008). Then, researchers compared the early and late responses by using a T-test on the average of key constructs of the study. The results showed no significant differences.

Using the survey data (N = 337), researchers estimated the measurement model of nine constructs. All constructs were modeled with reflective indicators. To evaluate the efficiency of the model, we used partial least squares (PLS) (SmartPLS 3) to conduct both confirmatory factor analysis and model testing. We employed PLS for two reasons. First, this research focused on exploring the acceptance of the restructured model with predetermined factors. PLS is a suitable method because of its exploratory and predictive power in the restructured model

(Peng & Lai, 2012; Peng, Prybutok, & Xie, 2020). Second, the sample size is not sufficiently large to meet covariance-based SEM's requirements. PLS is less restrictive on sample size without a strict distribution assumption (Chin, Marcolin, &Newsted, 2003).

Following the PLS-SEM evaluation method created by Peng and Lai (2012) and Ringle, Wende, and Becker (2015), researchers evaluated the measurement model and the structural equation model. We utilized the suggested 5,000 bootstrapped samples to estimate bootstrap standard errors for the T-test calculations (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Comprehensive results of factor loadings can be found in the appendix.

Table 15: Construct Correlation, Reliability, and Validity

	CCB	CRE	SNO	PEU	SA	SE	SN	TB	TI	CA	CR	AVE
CCB	**0.880**									0.855	0.911	0.774
CRE	0.391	**0.882**								0.857	0.913	0.778
SNO	0.374	0.563	**0.807**							0.933	0.944	0.651
PEU	0.340	0.530	0.553	**0.770**						0.930	0.941	0.593
SA	0.290	0.543	0.482	0.548	**0.879**					0.926	0.944	0.772
SE	0.333	0.501	0.457	0.585	0.466	**0.877**				0.848	0.909	0.770
SN	0.338	0.491	0.337	0.359	0.490	0.418	**0.911**			0.897	0.936	0.830
TB	0.409	0.667	0.690	0.735	0.617	0.682	0.504	**0.774**		0.939	0.947	0.598
TI	0.315	0.602	0.552	0.590	0.696	0.574	0.582	0.759	**0.827**	0.906	0.928	0.684

Note: The numbers in diagonal cells are the square root of AVE; lower diagonal numbers are inter-factor correlation (φ) (Hair et al., 2006). CCB=Calculative Cost/Benefit, CRE=Cognitive Reputation, SNO=Situational normality, PEU=Perceived Ease of Use, SA= Structural Assurance, SE=Self-Efficacy, SN=Subject Norm, TB=Trusting Beliefs, TI=Trusting Intention, CA=Cronbach's alpha, CR=composite reliability.

3.4.2 Evaluation of the Measurement Model

We used SmartPLS 3 to evaluate the reliability and validity of the measurement model (Ringle et al., 2015). To evaluate construct reliability, we examined three measures, Cronbach's alpha, composite reliability, and the average variance extracted (AVE). The acceptable minimum bound of Cronbach's alpha is 0.70 (Nunnally, 1978). The acceptable minimum bound of composite reliability is 0.70. The recommended acceptable minimum

bound of AVE is 0.50, which means that indicators of the latent variable explain at least 50% of the total variance (Chin, 1998; Fornell & Larcker, 1981). According to Table 15, the values of Cronbach's alpha, composite reliability, and AVE for all measurements satisfy the requirements. Thus, the results confirm the reliability of the construct measurements.

Construct validity is the degree to which the instrument measures what it intends to measure. This research evaluated both convergent validity and discriminant validity. For convergent validity, researchers used factor loading and AVEs to examine convergent validity. For discriminant validity, researchers compared the square root of the AVE with inter-construct correlations and assessed the scale reliabilities represented by Cronbach's alpha and composite reliability.

3.4.2.1 Convergent Validity

Convergent validity evaluates the ability of variables on the same scale to load together or converge as a single construct. This research used factor loadings and AVEs to evaluate the degree of convergent validity. The recommended bound of factor loadings is 0.7 (Chin, 1998). The recommended acceptable minimum bound of AVE is 0.5. The appendix shows that the factor loadings of the four items are less than 0.7. We retained these items for analysis because either their loadings are close to 0.7 or they represent the theoretical aspect of the corresponding construct. Table 15, our AVE analysis, shows that all constructs have AVE values greater than the minimum of 0.5. In conclusion, factor loadings and AVEs show statistically sufficient evidence to support the convergent validity of the measurement.

3.4.2.2 Discriminant Validity

Discriminant validity assesses the extent to which variables from one construct are distinct from variables of another. Following the examination method introduced by Ghiselli, Campbell, and Zedeck (1981) and Hair, Sarstedt, Ringle, and Mena (2012), researchers

compared the square root of the AVE with the inter-construct correlations to examine the discriminant validity. According to Table 15, the square root of AVE values in all constructs are higher than the inter-construct correlations. After that, we evaluated the scale reliabilities represented by Cronbach's alpha and composite reliability. The Cronbach's alpha and composite reliability values for all constructs were higher than the recommended 0.7 level. These results support the discriminant validity of the construct measurements. In conclusion, the measurement model passed both reliability and validity examinations and was adequate for the analysis.

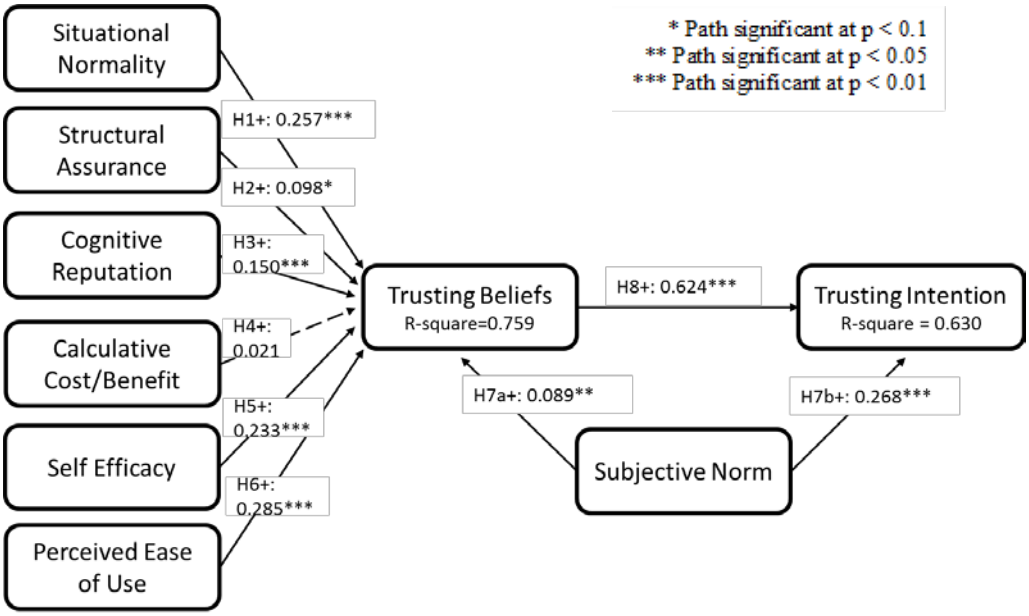

Figure 5: Research Model with Results

3.4.3 Structural Equation Model

The structural equation model shows the results of path coefficient estimates and the coefficients of determination, R-square. The path coefficient indicates the direct standardized strength of the relationship between constructs in the structural equation model. R-square measures the proportion of the variance in the dependent construct that is predictable from independent constructs. In the model, we hypothesized that six trusting base constructs have a positive influence on trusting beliefs. In addition, we proposed that subjective norm has both

direct and indirect influences on trusting intention. According to Figure 5, the results indicate that the research model has a good fit with the R-square values. The R-square on trusting beliefs is 0.759, and the R-square on trusting intention is 0.630. High R-square values support the assumption that trust formation could explain patients' health information technology acceptance.

Table 16 summarizes the results of hypothesis testing. Overall, the path analysis supports eight out of nine hypotheses. As shown in Table 16, five trusting base constructs have significant positive influences on trusting beliefs. In detail, three institutional factors, situational normality, structural assurance, and cognitive reputation have a statistically significant positive influence on trusting beliefs with coefficient values of 0.257, 0.098 and 0.15. One personal factor, self-efficacy, has a positive influence on trusting beliefs with a coefficient value of 0.233. The technical factor, perceived ease of use, shows the strongest influence on trusting beliefs in the research model with the coefficient value of 0.285. Subjective norm shows positive significant influences on trusting beliefs and trusting intention with the coefficient values of 0.089 and 0.268. Moreover, the significant coefficient value of 0.624 supports the strong positive relationship between trusting beliefs and trusting intention.

Table 16: Summary of Hypothesis Tests

	Hypothesis	Path Coefficient	T Statistics	Supported
SNO -> TB	H1	0.257	6.369***	Yes
SA -> TB	H2	0.098	1.926*	Yes
CRE -> TB	H3	0.150	3.366***	Yes
CCB -> TB	H4	0.021	0.688	No
SE -> TB	H5	0.233	4.943***	Yes
PES -> TB	H6	0.285	6.132***	Yes
SN -> TB	H7a	0.089	2.416**	Yes
SN -> TI	H7b	0.268	5.817***	Yes
TB -> TI	H8	0.624	13.658***	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

3.5 Discussion

This research addresses the determinants of trust in health information technology. We proposed the enhanced trust model with survey data. The findings support the relationship between trusting base constructs, subjective norm, trusting beliefs, and trusting intention. Our research model successfully uses institutional factors, personal factors, and a technical factor to explain patients' trusting beliefs and to confirm the influence of subjective norm on trusting beliefs and trusting intention. This work not only supports previous research in trust and technology acceptance but also empirically validates the proposed research model in health information technology.

Research results support prior studies in trust and technology acceptance. First, our research bolsters the opinion that trusting beliefs have a significant influence on the consumer's trusting intention to use a health information technology (Li et al., 2008; McKnight et al., 2002a). Second, research results support the prior research findings that institutional factors have significant positive influences on trusting beliefs (Li et al., 2008). Given the exploratory nature of this research, we believe that the research model accurately explains the best understanding of trusting base constructs and is appropriate for us to conduct the study in this context.

3.5.1 Contribution to Theory

Our findings suggest that the model in this study can explain a large percentage of variation of the patients' trust in HIT. The high R-square values of trusting beliefs and trusting intention indicate that the model confirms the patients' trust formation mechanism. Five trusting base constructs significantly affect trusting beliefs, and one construct analyzed by previous research does not influence the trusting beliefs in our study.

First, this paper contributes to trust and technology acceptance research by documenting trust formation with three components: institutional factors, a technical factor,

and personal factors. Institutional factors analyze the influence of situational normality, structural assurance, and cognitive reputation. Personal factors analyze the influence of calculative cost/benefit and self-efficacy. Finally, the technical factor considers the perceived ease of use of the OCAS. This composition offers strong predictive power for explaining patients' trusting belief formation as evidenced by the high R-square value. Since patients tend to be concerned about the potential risk of HIT, which offers no direct assurance that the HIT is secure, trust in the service provider therefore is a significant factor in influencing patients' intention to interact with the service provider's OCAS (Li et al., 2008; McKnight et al., 2002a).

Second, the research model incorporates two new constructs: perceived ease of use and self-efficacy (Benbasat & Wang, 2005; Montoya-Weiss et al., 2003; Zhou, 2012). Perceived ease of use measures the technical considerations. Self-efficacy assesses the patients' perceived ability to use the OCAS. Patients will compare new scheduling methods with the traditional one to determine whether the new one is more convenient. The results with young adults show that both have a significant influence on the formation of trusting beliefs. This population represents a good research starting point because young people are likely to try and use a new type of information technology (Chordas, 2001; Hordemann & Chao, 2012; Pempek et al., 2009). Future research can further explore the impact of these constructs on other study populations.

Third, the coefficient of calculative cost/benefit shows contradictory results with prior studies. Previous research reported that calculative cost/benefit shows a significant impact on trusting beliefs (Li et al., 2008; McKnight et al., 2002b). Trust study in another type of transaction-based information technology supports the significant relationship between the calculative-based factor and trust (Wang, Ngamsiriudom, & Hsieh, 2015). However, our research results reveal that patients' assessments of the benefits and costs of an OCAS do not have a significant influence on the formation of trusting beliefs. The type of medical

appointment system is one possible reason for this result. While most patients believe that sensitive medical information is necessary for their provider to treat them, views will differ on how sensitive a patient believes an appointment is. Since hospitals may disclose patients' information to insurance companies or third-party payers (Levy & Royne, 2009), patients will be concerned about healthcare information privacy. Moreover, most patients tend to believe that the medical appointment system is the beginning of the entire medical treatment and the calculative cost is potentially evaluated in terms of their view of medical treatment, not the appointment. Therefore, patients' attitude toward the system provider does not significantly influence their decision to trust and adopt the system.

3.5.2 Contribution to Practice

Trust enhancements are an important concern for medical practitioners to encourage in their interaction with patients. The results of the study suggest that a positive provider reputation and a well-designed OCAS can motivate patients to trust and show the intention to use the technology. Research findings suggest that patients will consider institutional, technical, and personal factors to make the acceptance decision. When faced with unfamiliar information technology, consumers consider alternative "good reasons" to find evidence of trustworthiness (Lewis & Weigert, 1985). To strengthen patients' trust, healthcare organizations could focus on institutional and technical factors. For example, they should begin with reputation building and system design to establish a foundation of positive information which is communicated through both formal and informal information channels to help patients to increase their trust in their technical service.

Research results suggest the importance of institutional factors. According to Figure 5, three institutional factors positively affect patients' trusting beliefs. Reputation is an important initial trust builder and it has a significant positive influence on user's trust (McKnight et al., 2002a; Yahia, Al-Neama, & Kerbache, 2018). It is valuable for healthcare organizations to

build and maintain a positive reputation. In addition, to contribute to situational normality, healthcare organizations must work to enhance three sub-dimensions: benevolence, competence, and integrity. It is important for healthcare organizations to recognize that these elements earn patients' trust, which will help patients to build the trusting intention to use an OCAS. Moreover, the positive, significant influence from structural assurance on trusting beliefs is another aspect that healthcare organizations should focus on. When users must post their personal information with unfamiliar groups, they prefer that their personal health information is preserved confidentially by the service provider (Chang, Liu, & Shen, 2017). Patients believe that regulations, laws, and social norms can protect them while using an OCAS. Knowledge of regulations, laws, and social norms increases the perception that the system is safe for patient use. Healthcare organizations should present related policies on the front page of an OCAS, indicating that patients' information is secure, patients' privacy is protected, and interactions with users are strictly confidential (Li et al., 2008).

In addition, the results suggest that the technical factor will significantly influence patients' trust beliefs. Perceived ease of use has a significant influence on the formation of trusting beliefs. A well-designed OCAS can help healthcare organizations gain patients' trust. Website quality perception is an important trust builder that has the greatest impact on the formation of consumer trusting beliefs (McKnight et al., 2002a). Healthcare organizations can improve the quality of their OCAS by focusing on ease of use, friendly interfaces, and clear operational guidelines. For example, OCAS should have a clear and friendly graphic style. The use of imagery and iconography can promote consumer confidence in the professionalism of the organization and improve the security of system operations (Montoya-Weiss et al., 2003). More graphics also tend to make the system more attractive and understandable to patients. Improving these aspects of an OCAS can make the system easier and more desirable to use than a phone call. A well-designed calendar scheduling function can help patients identify the

most suitable time to see the provider and help them to take greater control of managing their health. Such a positive experience can positively influence the formation of patients' trusting beliefs in an OCAS.

3.6 Limitations

Our study has two limitations but also suggests opportunities for future research. The first limitation of the study is the use of young adults via a university sample. Although the university student sample represents a valid study population of users of an OCAS, the use of broader samples with various backgrounds, ages, and work experiences could provide a better understanding of patients' trusting beliefs formation in OCAS across the lifespan. Second, the small proportion of the OCAS users in the sample may potentially limit the validity of the research model. Future research could study a virtual OCAS with detailed analysis.

3.7 Future Research

Although prior research finds that calculative cost/benefit has a significant positive influence on the formation of trusting beliefs (Li et al., 2008), our result does not support this relationship. Patients' calculative benefits and costs related to an OCAS does not influence the formation of patients' trusting beliefs. This is potentially due to the payment model of healthcare delivery. Patients only interact with an OCAS to make appointments. They subsequently will visit healthcare organizations to complete the healthcare transaction in person. This is different from e-vendors that complete fully online transactions with patients in the digital world. Future research can analyze the proposed research model and compare the difference between e-vendors without brick and mortar stores and healthcare organizations.

3.8 Conclusion

This research provides a clear overview of the mechanism of patients' trust formation in an OCAS. The results of our study make significant contributions to both theory and practice.

This study provides contributions and insights for medical practitioners seeking to launch and operate their OCASs more effectively and efficiently. The understanding of the mechanism associated with the determinants of patients' trust and trusting intention to use an OCAS can provide valuable direction to healthcare organizations in establishing a health information technology-based service. Also, the understanding of trust formation in HIT can help medical practitioners to better manage the relationships with current patients and to attract more patients. To understand which construct contributes positively to trust formation, the research team built the enhanced trust model. Within the model, six trusting base constructs analyze the influences from institutional factors, personal factors, and a technical factor. Subjective norm measures the social influence on patients' trust in technology acceptance. Research results support the value of the model. The validated trust model used in this study contributes to the body of research on trust and confirms the value of using the trust to explain individual technology acceptance. Based on the results of our research, medical practitioners can foster the development of five significant trusting base constructs to win patients' trust and intention to use their health information service.

Appendix: Measurement Items with Factor Loadings

Item scales: 1 (strongly disagree) to 5 (strongly agree).

	1	2	3	4	5	6	7	8	9
Perceived Ease of Use									
My interaction with the online clinic appointment scheduling system is clear and understandable.	0.769								
It is easy to get the online clinic appointment scheduling system to do what I want it to do.	0.800								
Learning to use the online clinic appointment scheduling system is easy.	0.796								
It is easy for me to find a suitable device that allows me to use the online clinic appointment scheduling system.	0.730								
Overall, I believe that the online clinic appointment scheduling system is easy to use.	0.879								
It is easy to schedule the appointment on the online clinic appointment system.	0.800								
The online clinic appointment scheduling system provides an easier way of making an appointment than a phone call.	0.665								
It is easy to navigate the online clinic appointment system.	0.830								
The online clinic appointment scheduling system offers a logical layout that is easy to follow.	0.816								
I like the look and feel of the online clinic appointment scheduling system.	0.694								

	1	2	3	4	5	6	7	8	9
The online clinic appointment scheduling system is an attractive system.	0.659								
Structural Assurance									
I feel assured that legal structures adequately protect me from any problem with online appointment scheduling services.		0.864							
I feel confident that regulations make it safe for me to use online appointment scheduling services.		0.886							
I feel confident that laws make it safe for me to use online appointment scheduling services.		0.914							
I feel confident that social norms make it safe for me to use online appointment scheduling services.		0.862							
In general, online appointment scheduling services are robust and safe.		0.866							
Situational Normality									
I feel most clinics act in the customer's best interest.			0.743						
If a patient requires help, most clinics do their best to help.			0.809						
Most clinics are interested in the patient's well-being.			0.798						
In general, most clinics are competent at serving their patients.			0.812						
I feel that most clinics are good at what they do.			0.773						
Most clinics do a capable job of meeting patients' needs.			0.796						
I am comfortable relying on clinics to meet their obligations.			0.854						

	1	2	3	4	5	6	7	8	9
I feel fine using clinics since clinics generally fulfill their agreements.			0.835						
I always feel confident that I can rely on clinics to do their part when I interact with them.			0.835						
Calculative Cost/Benefit									
The online appointment scheduling system, as well as the related clinics, have nothing to gain by not caring about me.				0.857					
The online appointment scheduling system, as well as the related clinics, have nothing to gain by functioning inefficiently.				0.897					
The online appointment scheduling system, as well as the related clinics, have nothing to gain by being dishonest in its interactions with me.				0.885					
Cognitive Reputation									
Online clinic appointment scheduling systems are known for working in the patients' best interest.					0.854				
Online clinic appointment scheduling systems have a reputation for being competent.					0.909				
Online clinic appointment scheduling systems are recognized for being reliable.					0.882				
Self-Efficacy									
I am confident in using the online clinic appointment scheduling system if I have only the online instructions for reference.						0.804			

	1	2	3	4	5	6	7	8	9
I am confident in using the online clinic appointment scheduling system even if there is no one around to show me how to do it.						0.918			
I am confident in using the online clinic appointment scheduling system even if I have never used such a system before.						0.906			
Subject Norm									
I believe that most people who are important to me think I should support the online clinic appointment scheduling system.							0.920		
I believe that most people who are important to me think I should provide personal information to the online clinic appointment scheduling system.							0.893		
I believe that most people who are important to me think I should use the online clinic appointment scheduling system.							0.920		
Trusting Beliefs									
I believe that an online clinic appointment system would be employed in my best interest.								0.739	
If I required help, the online clinic appointment scheduling system would have help available via FAQ's or online chat with customer service.								0.735	
The online clinic appointment scheduling system administrators are concerned about my well-being.								0.685	
The online clinic appointment system is effective in scheduling personal medical appointment.								0.783	

	1	2	3	4	5	6	7	8	9
The online clinic appointment system would perform its role of scheduling personal medical appointment very well.								0.812	
Overall, the online clinic appointment scheduling system is a useful way of scheduling a personal clinic appointment.								0.810	
Overall, the online clinic appointment scheduling system provides a proficient way of scheduling a personal clinic appointment.								0.798	
In general, the online clinic appointment scheduling system would schedule a clinic appointment efficiently.								0.831	
The online clinic appointment scheduling system administrator is honest in dealing with me.								0.759	
I would characterize the online clinic appointment scheduling system as honest.								0.792	
The online clinic appointment scheduling system helps the clinic to keep its commitments.								0.740	
The online clinic appointment scheduling system is genuinely helpful.								0.789	
Trusting intention									
I feel comfortable depending on an online clinic appointment scheduling system.									0.857
I feel comfortable letting my loved ones use an online clinic appointment scheduling system.									0.889
I feel comfortable supporting the adoption of an online clinic appointment scheduling system in the U.S.									0.864

	1	2	3	4	5	6	7	8	9
I am willing to provide general personal information like my name, address, and phone number to the online clinic appointment scheduling system.									0.816
Faced with a serious illness that required me to see the doctor, I would use the system to make the appointment.									0.707
If I was ill, I would use the online clinic appointment scheduling system again.									0.816

CONCLUSION

Essay 1 used meta-analysis and CSA to investigate the impact of QM practices on operational performance in the healthcare industry. There are two research questions, “Do QM practices positively correlate with operational performance in the healthcare industry?” and “Do gaps exist between the findings from the literature and practices in the healthcare industry?” Meta-analysis was applied to analyze the articles in the QM area. Researchers built the CSA method to analyze healthcare industry practices. According to the research results, meta-analysis shows that all categories in the Baldrige Excellence Framework are positively correlated with operational performance. CSA shows that three categories are positively correlated with operational performance. This study identified the gaps between academic literature and industry practices. The results provided insights for healthcare organizations to consider when planning to improve operational performance.

Essay 2 investigated the patient satisfaction of Baldrige Award recipients in the healthcare sector. Researchers compared the award winner’s patient satisfaction with control parties, including the matching hospitals, state average, and national average. Five years of data were collected from the HCAHPS survey. Researchers used the event study method to evaluate the difference between the award winners and control parties based on the mean and estimated median control adjusted percentage changes. According to the research results, award winners show the performance improvement before they receive the MBNQA. Mainly, in composite topics and individual topics, there is a significant improvement between the year -2 and other years. We believe that the Baldrige Award winners perform better than the control parties in patient experience. As a result, the Baldrige Excellence Framework effectively helps healthcare organizations to improve patient satisfaction and quality management performance.

Essay 3 examines how a HIT contributes to QM practices. This research provides a detailed overview of the patients’ trust in the healthcare information system by analyzing the

mechanism of patients' trust formation in the system. As a healthcare information system, clinic appointment system can help medical institutions to improve the efficiency of communication with patients and build patient-centered practice. Understanding the patient's trust can help medical companies better complete quality management control and upgrade. An enhanced trust model was assembled to recognize patients' trust towards the OCAS. This trust model consists of nine constructs, including six trusting base constructs, subjective norm, trusting beliefs, and trusting intention. The research results prove the feasibility and reliability of the model. Cognition of patients' trust can help healthcare organizations optimize the use of HIT and win the trust of patients, thereby improving the efficiency of the quality management.

Collectively, the three essays in this dissertation have contributed to understanding better the relationship between QM practices and performance in the healthcare industry via the conduct of three studies. Research results contribute both to advancing QM theory as well as in developing a unique text mining method that is illustrated by examining QM in the healthcare industry. In summary, there are three significant contributions. First, this research analyzes the QM practices in healthcare and contributes to theory development. Second, this research attempts to develop a unique text mining method, namely the Confirmatory Semantic Analysis (CSA). Third, this research built an enhanced trust model. The validated trust model contributing to the body of research on the trust of healthcare information technology.

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