

AN ABSTRACT OF THE DISSERTATION OF

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Title: Work Experience and Improvement Behavior: A Preliminary Study.

Abstract approved:

Chinweike I. Eseonu

Improvement behaviors, specifically double loop, have been linked to successful lean implementations. Although the lean literature supports individual cognitive transformation to double loop learning as an important element of lean success, there remains a strategic methodology to achieve sustainable double loop behavior. Perceptions toward behavior and employee satisfaction have been used to study behaviors in other fields of literature but have not been used to achieve improvement behavior.

A case study at the registration department in a United States-based governmental service organization (Organization O) was conducted. To understand how perceptions affect improvement behavior, data for the study were gathered through interviews, field notes, and organizational documents before and twenty months after a conceptual change based training. The theory of planned behavior was used to organize the case study data. A qualitative analysis of perceptions, improvement behaviors, and mindsets was performed. Perceptions driving the predominant improvement behaviors and mindset were used to guide the conceptual change based training.

A second research objective was to understand how employee satisfaction reflects changes in improvement behaviors. A qualitative analysis was completed, and a coding scheme based on the modified SERVPERF survey was used to identify change in employee satisfaction representing perceptions towards performing predominant improvement behaviors before and twenty months after training. Findings were then

used to identify aspects of the work environment for the organization to prioritize to increase both employee satisfaction and double-loop behaviors. Supplemental analysis using quantitative analysis of the modified SERVPERF survey results along with the Multicriteria Satisfaction Analysis (MUSA) was performed to study employee satisfaction before, eight months after, and twenty months after training.

Employees and managers predominantly expressed performing single loop behavior before training and engaged in single loop expediting mindsets prior to training. Twenty months after training, both managers and employees mainly expressed engaging in double loop behaviors and primarily engaged in a single loop mindset. Perceptions before training mainly revolved around not being able to see the benefit and perceiving difficulty in performing double loop behaviors. However, despite double loop learning behavior being the dominant behavior twenty months after training, several indicators suggested that both managers and employees would eventually revert to single loop behavior without additional interventions.

In relation to perceived outcomes from performing improvement behavior before and twenty months after training, employees and managers expressed an increase in satisfaction with the promotion of collaboration. Unlike the managers, employees expressed increase in dissatisfaction mostly with managers' sincere interest in resolving problems. Differences in the roles and experiences of managers and employees were noted along with differences in dissatisfaction and perceptions on double loop behavior twenty months after training.

This dissertation used the theory of planned behavior, the modified SERVPERF survey along with conceptual change model to provide a methodology for managers and academics to 1) identify key perceptions to change and maintain double loop behavior and 2) identify how satisfaction reflects change in improvement behavior. The findings were not generalizable since a case study was conducted to answer the research questions. Implementing this study in a larger organization or different industries is needed to see how perceptions and satisfaction differ in varying levels of management and different settings.

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Work Experience and Improvement Behavior: A Preliminary Study

by
Mina Azhar

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Mina Azhar, Author

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In the name of Allah, the Most Gracious and the Most Merciful.

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Dr. Waleed Khalid Mirdad assisted in the design of the training, the data collection, and coding of the qualitative data. Paola Grijlava assisted in the use of the Multicriteria Satisfaction Analysis. Dr. Rawan A M A J Alshaiji, Dr. Prashant Tiwari and Ashok Srinivas assisted in the data collection and interpretation of the data.

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DEDICATION

I dedicate this dissertation to

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He has and continues to provide all I need in this life.

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1 Introduction

1.1 Motivation

1.1.1 Theoretical Motivation

Lean manufacturing has grown globally, becoming the most widely accepted manufacturing strategy to improve business performance (Anthony et al., 2020; Gupta, Sharma & Sunder, 2016; Sanchez & Blanco, 2014; Singh & Singh, 2015). Despite the numerous benefits and widespread use of lean in organizations, a significant number of lean implementations have failed to achieve desired results or failed to sustain successes (Al-Haddad & Kotnour, 2015; Albliwi et al., 2013; Higuchi, Nam, & Sonobe, 2015; Martinez-Jurado & Moyano-Fuentes, 2014). In addition, negative psychological or social results have been reported from failed lean implementations, resulting in unintended and detrimental behaviors.

One possible reason for the widespread failure of lean implementations in driving sustained improvement is the lack of the trainer's understanding around the mechanisms for lean training and the trainee's understanding on applying appropriate lean tools (Mirdad & Eseonu, 2015). Ambiguity in applying lean can lead to using lean as a toolbox without critically evaluating the appropriateness of the specific tools (Gupta et al., 2016). Training is one of the most frequently mentioned critical success factors in lean literature. However, despite the extensive literature on training over the past 50 years, research on lean training has not led to an understanding or a set of measures for trainee perceptions or behaviors to guide the design of lean training sessions. The conceptual change model was developed to facilitate an understanding of employee learning and identify the applicability of lean (Mirdad, Hille & Melamed, 2015). Successful conceptual change based training enables employees to transition from using single loop to double loop learning behaviors. Double loop learning behaviors consist of the identification and elimination of root causes of problems through reflection and investigation. The conceptual change model argues that to fundamentally change employee behavior, employees must understand lean at the cognitive level. However, behavioral change is not sustainable unless an employee's understanding of the work environment (Markova, 2009) is also considered. Employee

satisfaction has been used to identify the aspects of the work environment that employees have expressed satisfaction/dissatisfaction with when evaluating lean implementations (Grijlava & Eseonu, 2016). However, satisfaction with the work environment does not directly reflect an employee's tendency to perform a certain type of behavior.

The theory of planned behavior, the most applied theory in the social and behavioral sciences, provides a method to predict behavior based on perceived outcomes, perceived social pressure, and perceived behavioral control (Ajzen, 1985; Bosnjak, Ajzen & Schmidt, 2020). Theoretically, improvement behaviors, as defined by Mazur et al., (2012), zero loop, single loop, and double loop can be predicted using the theory of planned behavior. Understanding how perceptions drive improvement behaviors and analyzing how employee satisfaction reflects changes in improvement behaviors can guide effective conceptual change based training.

1.1.2 Applied Motivation

The conceptual change model was developed by Mirdad, Hille & Melamed, (2015). The conceptual change model recognizes the importance of the preparation phase, and the trainer's consideration of essential variables to achieve effective double loop learning transition. This research was motivated by the lack of research to understand the preparation phase of the conceptual change model.

A United States-based governmental service organization (Organization O) consists of various departments that work together to provide services concerning recreational boating through education, enforcement, access, and environmental stewardship throughout the state. Organization O transitioned from a DOS-based registration processing software to a more general-purpose system in 2014. The registration department, the largest source of revenue for Organization O, faced a significant backlog in registration processing. The backlog caused increased customer complaints and frustration. Customer satisfaction dropped significantly from a consistent 95% average to below 80%. The registration department stated that the backlog was mostly at the data entry processing level and officially requested more data entry staff. The director was faced with the question, *'Is there a way to increase registration department capacity other than*

adding more staff?’. The question posed by the director of Organization O is not uncommon in lean literature and provides a practical basis for this research. Providing a methodology for the preparation phase in the conceptual change model through the research conducted in Organization O uniquely contributes to the lean literature in the public sector.

1.2 Research Questions

Two research questions were formulated based on the theoretical and applied motivations. Table 1-1 provides a list of the research questions:

Table 1-1 Research Questions

Research Question 1 (RQ1)	How do perceptions affect employee and manager improvement behaviors?
Research Question 2 (RQ2)	How is change in employee and manager improvement behaviors represented in satisfaction?

1.3 Research Methodology

The study took place at the registration department in a United States-based governmental service organization (Organization O). The research used a “researcher as participant” approach to change improvement behavior (Chapman, 2014). This research differs from most studies that focus on sustaining improvement initiatives in general, implementing employee behavior interventions, or defining the relationship between varying factors that encourage/discourage improvement behavior without bringing these topics together as a single case study. A single case study provides a deeper understanding of the phenomena (Dyer & Wilkins, 1991; Siggelkow, 2007). An exploratory case study was deemed most appropriate to understand how improvement behaviors, perceptions, and satisfaction relate (Strauss & Corbin, 1994; Yin, 1994).

1.3.1 RQ1 Methodology

Research question one asked, “*How do perceptions affect employee and manager improvement behavior?*”. The study started with investigating the most applicable theory

for behavior change by examining the behavioral sciences. The theory of planned behavior emerged as the most prominent theory in this regard, which states that behavior is driven by perceptions specific to performing the behavior. However, the theory of planned behavior has not been used to predict the likelihood of employees performing improvement behaviors. In their study, Mazur et al. (2012) identified key improvement behaviors single loop quick fixing, single loop conforming, single loop expediting, double loop initiating, and double loop enhancing as key improvement behaviors. Mazur et al. (2012) argued that no one in healthcare would let an error occur without doing anything so zero loop was not included. This research included zero loop improvement behaviors. The theory of planned behavior states that human action is guided by three categories of perceptions: attitude toward behavior, social pressure to engage in the behavior (also known as a subjective norm), and perceived control. Attitude toward behavior is an aggregate of employee beliefs about the likely consequences of performing the improvement behavior, which can be favorable or unfavorable. The social pressure to engage or not engage in behavior comes from an aggregate of employee beliefs about normative expectations of important people to the individual. Employee perceived control is an aggregate of employee beliefs about the presence of factors that may facilitate or impede the performance of the improvement behavior, which causes the employee to perceive performing the behavior as easy or difficult. Figure 1-1 presents the relationship between perceptions and improvement behavior.

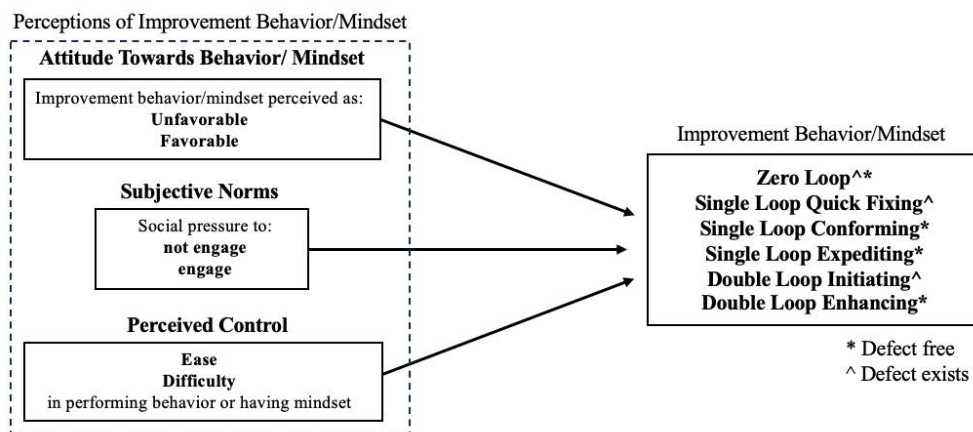


Figure 1-1 Conceptual Framework for RQ1

Data was collected through a qualitative approach using semi-structured interviews, field notes, and documents, before training and twenty months after training. The researcher identified and qualitatively analyzed current improvement behaviors and mindset, along with the driving perceptions, to answer research question one. Two groups of employees (employees and managers) were studied. Improvement behaviors are past improvement behaviors mentioned by the employee/manager in the interviews. A behavior was identified as dominant if the behavior had the greatest frequency of occurrences mentioned in the interviews. An improvement mindset is a measure of an employee's system knowledge and the ability to assess system health/effectiveness for a desired outcome through interviews. A mindset was identified as dominant if the mindset had the greatest frequency of occurrences in the interviews. Negative perceptions of the dominant behavior/mindset help identify which parts of the work environment are inhibiting double loop behavior, which was then used as a guide to help facilitate cognitive conflict in the conceptual change based training. Negative perceptions towards double loop behavior/mindset were used to guide the introduction and acceptance of lean concepts.

1.3.2 RQ2 Methodology

Research question two asked, "*How is change in employee and manager improvement behaviors represented in satisfaction?*" The literature on employee satisfaction was referred to answer research question two. Grijalva and Eseonu (2016) developed a Modified Service Performance (SERVPERF) survey to identify areas of the work environment to prioritize in a lean implementation/deployment based on employee satisfaction. However, employee satisfaction has not been correlated with an employee's likelihood of demonstrating double loop behaviors. A qualitative approach using semi-structured interviews and surveys was used to investigate research question two. The researcher coded, based on the satisfaction dimensions defined by the modified SERVPERF survey, the perceptions of the dominant behavior identified in research question one. The qualitative analysis investigated the change in employee satisfaction representing the change in employee perceptions towards performing the single loop behaviors before and double loop behaviors twenty months after training.

Figure 1-2 presents the relationship between satisfaction and improvement behavior guiding answering research question two. Improvement behavior is highlighted to emphasize that improvement behaviors are not part of the data analysis and that the perceptions used in the analysis are drivers of improvement behaviors identified from research question one.

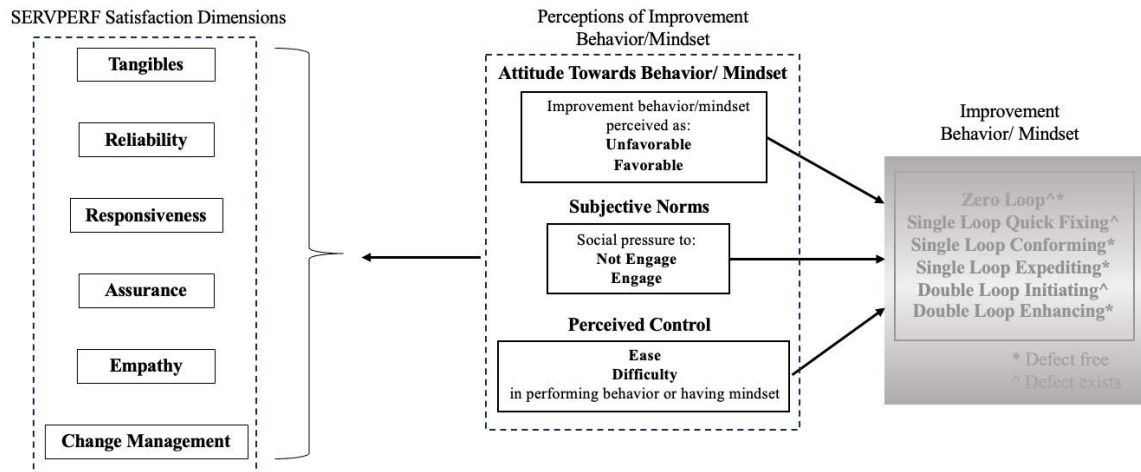


Figure 1-2 Conceptual Framework for RQ2

As a supplement analysis to the work for research question two, the researcher explored the use of multicriteria satisfaction analysis (MUSA) and the results from the modified SERVPERF survey to assess which areas of the work environment to prioritize in lean implementation and how employee satisfaction changes in three periods of time. The quantitative analysis compared three periods of time; before training, eight months after training, and twenty months after training.

1.4 Findings

1.4.1 RQ1 Findings

Data analysis from research question one found that before training employees most frequently referred to performing single loop conforming behaviors and engaged in single loop expediting mindsets. Managers predominantly referred to performing single loop expediting behaviors and exhibited single loop expediting mindsets. Employees' perceptions of single loop conforming behaviors before training were mainly frustrations stemming from the difficulty when performing conforming behaviors. Managers'

perceptions driving single loop expediting behaviors before training were mainly informed by the perceived benefit from performing expediting behavior. Before training, neither the managers nor employees were able to see how double loop behavior would benefit the department nor that other people in the department would support double loop behavior. During the ‘generate a meaningful conflict’ stage of the conceptual change based training, employees, supported by the trainers, discussed their concerns with managers. Both managers and employees were happy to know that, ultimately, both sides wanted to work together, even though the department had not previously facilitated collaboration. The department adopted huddles, 5S and Poka Yoke concepts. Employees and managers predominantly referred to performing double loop behaviors twenty months after training. However, employee and manager expressed negative perceptions with the performance of double loop behaviors, along with exhibiting a dominant single loop conforming mindset, suggesting that, without intervention, managers and employees will eventually revert to single loop behavior. The employees’ negative perceptions mainly stemmed from their negative interactions with managers. However, managers mainly expressed positive perceptions toward double loop behaviors.

1.4.2 RQ2 Findings

Through the qualitative analysis, based on the perceived favorable outcomes and perceived control in performing single loop behaviors compared to enhancing behaviors, both managers and employees experienced an increase in satisfaction with change management. However, employees reported a different experience than managers. Managers did not experience dissatisfaction, while employees experienced a high level of dissatisfaction in how the employees perceived outcomes, specifically in the lack of interest shown by managers in resolving problems when they occur (reliability — problem resolution). Employees also experienced dissatisfaction with the perceived difficulty in performing double loop enhancing behavior, specifically in terms of independence (change management – learning) and the employee’s needs being understood (empathy — needs).

From the supplemental analysis, the research identified that managers and employees both experienced an increase in satisfaction every year from 2018 to 2020 in

overall satisfaction of change management. MUSA suggested that tangibles be a priority improvement but improving change management would result in larger margins of improvement before training. Eight months after training, MUSA suggested no satisfaction dimension should be prioritized. Twenty months after training, MUSA suggested that improving responsiveness and reliability would result in larger margins of improvement before training.

1.5 Contributions

This research has identified key perceptions, guided by the theory of planned behavior (Ajzen, 1985), that drive improvement behaviors. This dissertation analyzed changes in employee satisfaction, specifically representing perceptions driving dominant improvement behaviors. This dissertation also provided a methodology that can be used in the preparation phase of conceptual change based training.

1.6 Conclusion

This research aimed to increase the effectiveness of conceptual change based training by studying how perceptions drive improvement behavior and how satisfaction reflects improvement behavior. Data were collected from a case study conducted in a public organization in the United States. Qualitative analysis identified dominant improvement behaviors, linked perceptions driving improvement behavior, and compared differences between employees and managers. Qualitative analysis also analyzed the change in satisfaction in relation to changes in improvement behavior. Supplemental quantitative analyses were performed on the satisfaction survey results.

2 Literature Review

This research is focused on developing a systematic methodology to achieve sustainable improvement behavior in lean implementations. The methodology will focus on how to identify participants' current improvement behavior and the underlying perceptions to provide an effective preparation guide in training lean concepts. The chapter begins with a summary of lean history and how lean has grown due to its numerous benefits. The next section investigates the challenges in achieving successful lean implementation by highlighting critical success factors and exploring how training lean concepts were studied in the literature.

Next, learning and the methods for achieving improvement behaviors in lean training literature are presented, including the conceptual change model as a training strategy to achieve the desired improvement behavior. The next section presents the theory of planned behavior, the leading theory in predicting behaviors, and investigates the existing literature studying both the theory and improvement behaviors. Next, a survey on employee satisfaction specifically designed to be used along with the conceptual change model in training. Finally, the last section will summarize the gaps in the literature and how this dissertation aims to fill those gaps in the literature.

2.1 Lean

2.1.1 Origins of Lean Manufacturing

In the 1940s, the United States Military taught Japan continuous improvement, which was job simplification with modifications by workers. Continuous improvement was taught to avoid mass starvation when rebuilding the Japanese industry through "Training Within Industries" programs (Robinson, 1990). Two decades after World War II, the United States became complacent, and the implementation of continuous improvement mostly disappeared. Eiji Toyoda and Taiichi Ohno learned from the massive waste in the USA's manufacturing industry and understood that Japan could not afford to do the same (Dahlgard & Dahlgard-Park, 1999). The subsequent Japanese quality revolution from

1950 to 1980 was triggered by the United States' rejection of Toyota's new Crown model since it did not match market demands (Dahlgaard-Park, 2000).

The term "lean production" was coined by The International Motor Vehicle Project to differentiate Toyota's ability to manufacture a variety of models from the traditional Western mass production of one model (Krafcik, 1988). In the 1990s, inspired by the Toyota Production System, Womack, Jones, and Ross (1990) made lean thinking or lean production popular through their book 'The Machine That Changed the World.'

Lean thinking focuses on creating low-cost improvements based on eliminating waste (Muda) (Dahlgaard-Park & Dahlgaard, 2006). Lean can be implemented by an organization as a systematic set of principles and best practices to eliminate variation, create standardization, and identify new areas of improvement until it can identify patterns of excellence (Liker, 2004; Sanchez & Blanco, 2014; Womack, Jones, & Roos, 1990). Since lean equips organizations with the ability to respond to constantly changing customer requirements through low-cost improvements and waste elimination, lean has had wide global acceptance in varying industries (Anthony et al., 2012; Bhamu & Sangwan, 2014; Dahlgaard-Park & Dahlgaard, 2006). The following section will present the benefits found from the implementation of lean and how it has evolved.

2.1.2 Benefits and Implementation of Lean in Varying Industries

In the 1990s, lean implementations decreased cycle time, delivery time, and production costs and increased customer satisfaction (Taylor & Brunt, 2001). Lean manufacturing grew globally and became one of the most widely accepted manufacturing strategies to improve business performance (Anthony et al., 2020; Ghobadian et al., 2020). In the public sector, lean was found to be the most explored methodology for improvements, representing 60% of the examined papers (Rodgers & Antony, 2019).

Within the service sector, healthcare had the fastest pace of lean development in the literature. Seventy-eight percent of lean papers in the health sector came mostly in the years 2015-2017 (Henrique & Filho, 2018). Qualitative benefits were also found from implementing Lean, such as improved working conditions, increased loyalty, and better relationships (Janjic, Todorovic & Jovanovic, 2019). Various industries applying lean tools

and philosophies within their organization reported various benefits. Table 2-1 shows various benefits achieved in seven different industries.

Despite the numerous benefits and widespread lean deployment in organizations, a significant number of lean implementations have either failed to achieve desired results or not gain any benefits at all (Al-Haddad & Kotnour, 2015; Albliwi et al., 2013; Martinez-Jurado & Moyano-Fuentes, 2014, Moosa & Sajid, 2010, Ringen & Holtskog, 2013). The challenges in implementing lean are discussed in the following section.

Table 2-1 Lean Benefits from Seven Different Industries

Industry	Author	Reported Benefits from Lean Implementation
Healthcare	Ibañez et al. (2021)	Project: <i>Creating patient-centered treatment enriched with lean processes</i>
		• Savings of \$9,348,117 from waste reduction • Increased revenue by \$654,998 in surgery department
Education	Ross et al. (2018)	Project: <i>Using the A3 lean framework to improve student reporting of mistreatment to increase opportunities to achieve resolution and prevent future occurrences</i>
		Previously, the proportion of students who experienced mistreatment was significantly higher than the proportion of students who report mistreatment. The proportion of students reporting mistreatment increased by 21.45%.
Information Technology	Keung (2013)	Project: <i>Employing "double-loop" learning processes in IBM Shenzhen Branch</i>
		• Receives 1,895 improvement suggestions from different departments • Saved USD 1,253 from effective cost control • In increasing corporate social responsibility, a total of 38 trees were not cut down • Reduced 1,653 tons of carbon dioxide emission • Saved 2008K kilowatt-hour of electricity
Food processing	Amani et al (2015)	Project: <i>Implementing lean at industrial production line to reduce waste</i>
		Achieved 50% food waste reduction
Construction	Ballard & Howell (2003)	Project: <i>Applying lean rules and tools to precast concrete fabrication</i>
		• Increased the productivity rate of Shear Wall production by 181% • Reduced lead times by 1 week • Reduction in cycle time to 1 1/3 days • Increased T's production cell by 100% • Factory throughput increased from a weekly rate of £130,000 to £260,000
Transportation	Argiyantari, Simatupang & Basri (2022)	Project: <i>Applying lean thinking at a pharmaceutical distribution company</i>
		• 40% reduction in overall transportation costs • 75% reduction in total lead time • 200% improvement in truck productivity • 100% improvement in truckload capacity utilization
Lean Office	Freitas et al. (2018)	Project: <i>Implementing lean office</i>
		• Effective knowledge transfer mechanisms • A favorable environment for engagement of people that encourages interaction and supports the creation and sharing of new knowledge.

2.2 Lean Implementation Challenges

Lean interventions have primarily focused on improved process outcomes (Mason, Nicolay, & Darzi, 2015; Vest et al., 2009). The results were short-lived from those that successfully improved business performance, and the long-term impact was marginal (Gomez Segura, Oleghe, & Salonitis, 2020).

There are various reports of widespread lean implementation failures. Ringen & Holtskog (2013) reported two out of every three CI initiatives. Rahbek Gjerdrum Pedersen & Huniche (2011) reported up to 70 percent, and multiple reports mention more than 90 percent (Basin & Burcher, 2006; Martinez-Jurado & Moyano-Fuentes, 2014).

The Saskatchewan government spent \$44 million without any statistically significant impact from the lean implementation because of pushback from key actors (physicians and nurses), ineffective training, and the top-down manner in the implementation was presented (Goodridge et al., 2018; McIntosh, 2016; Moraros, Lemstra & Nwanko, 2016).

At the end of two years, only one out of 20 SME manufacturing organizations that were part of the New Zealand government's Lean program were able to sustain lean, with four of the organizations abandoning lean altogether and several going out of business due to the lack of understanding of lean philosophies (Grigg, Goodyear & Frater, 2018). In Vietnam, less than 20% of SMEs successfully applied lean after one year (Minh & Kien, 2021).

Other than failed process improvement goals, negative psychological or social results have also been reported. In the Saskatchewan healthcare example, Moraros, Lemstra, & Nwanko (2016) found that even though there is a potential benefit to process outcomes, the benefits were inconsistent, and the analysis suggested a negative association with financial costs and worker satisfaction. Acts of omission (e.g., paying lip service, failing to report incidents, passing on work, foot-dragging), commission (e.g., acts of sabotage, complaints, industrial action), discrediting, and contempt were observed as a result of negative behaviors from management during lean implementation (e.g., physical coercion, de-legitimizing employee's knowledge and domination) (Salentijn, Beijer & Antony, 2021).

2.2.1 Critical Factors

To identify the critical success factors in lean literature throughout the years, a search was performed based on the following terms *barriers*, *critical success factors*, *critical failure factors*, and *lean*. Only publications focused on identifying the critical factors of successful lean implementation were selected. Thirty-one papers were identified. The earliest paper was found from the year 2007, and the latest from 2023. Two hundred and fourteen critical factors were found, which were then further organized into 32 categories. The number assigned to each category is the number of papers that included the category as a critical factor. A Pareto chart (Figure 2-1) was built to identify the factors most frequently cited in the literature as the most critical to successful lean implementation.

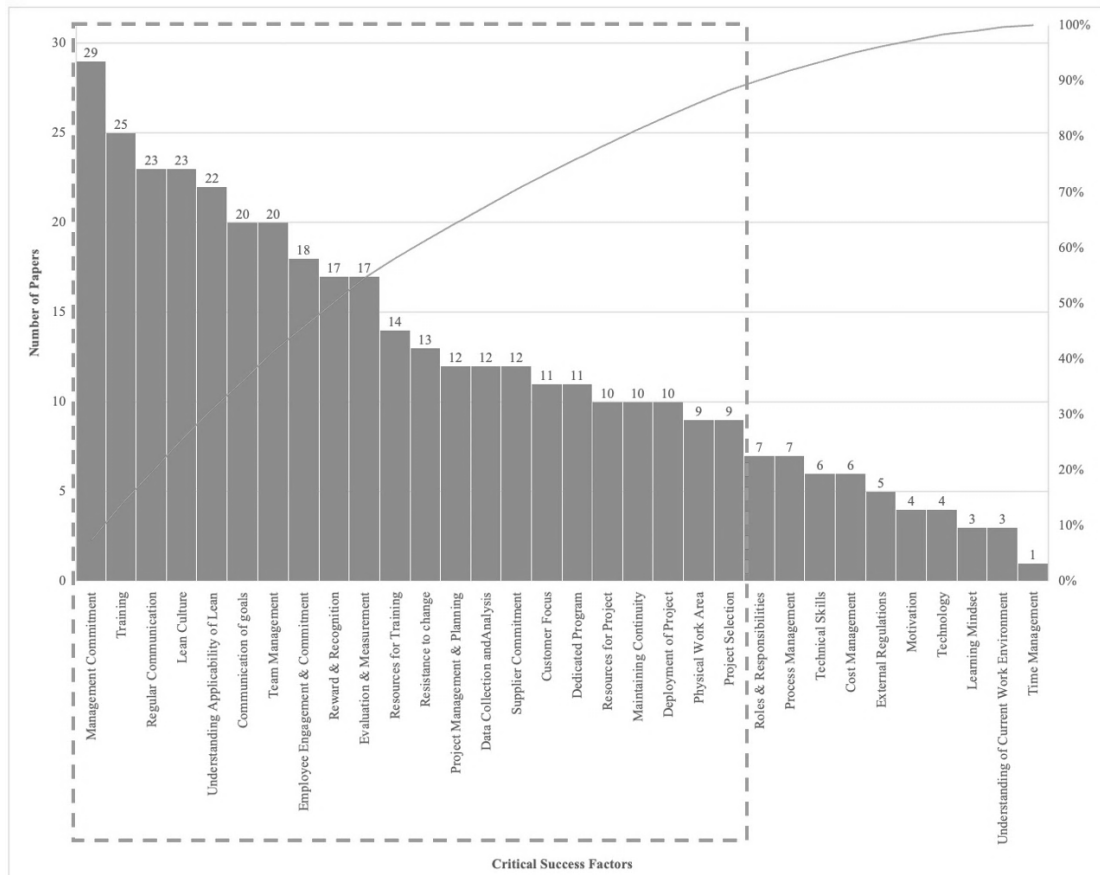


Figure 2-1 Critical Success Factors in Lean from 2007 – 2023

Three out of the first four factors, in Figure 2-1, relate to perceptions of the work environment (management commitment, regular communication, and lean culture). Training was identified as the second most cited critical success factor, which will be

explored further in the following section. At the individual level, understanding lean was the most important aspect. How an individual understands lean affects their action and, therefore, determines the success of implementing lean. Benefits will wear off if continuous learning is not part of the lean transformation (Ballé et al., 2019; Netland & Powell, 2017).

The lack of understanding in applying Lean comes from a lack of agreement around lean principles definitions and practices among experts and in the lean literature (Mirdad & Eseonu, 2015). Taiichi Ohno, a Toyota production engineer who contributed to developing the Toyota Production System, admitted to deliberately misleading lean terms and words to create a disadvantage for the United States (Meyers, 1990). The ambiguity of defining lean can cause a lack of distinction between the system and its components. This ambiguity can lead to the use of Lean as just a toolbox and missing the sensible philosophy behind it (Gupta et al., 2016). It also creates difficulty for organizations to replicate best practices by other organizations from various industries (Albiwi et al., 2014).

2.2.2 Teaching Lean

Training is one of the most frequently mentioned critical success factors in lean implementation. However, despite the extensive literature on training over the past 50 years, research on training in the context of lean process improvement has been sparse based on a 1966 to 2014 lean literature synthesis by Hille & Eseonu (2015). This literature review extends Hille & Eseonu's work beyond 2015 to understand how lean training literature has evolved. The articles were organized by categories defined in Tables 2-2 and 2-3.

Table 2-2 Article Category Definitions

Article Category	Definition
Primary theory	An article that develops a seminal theory that is not an extension of another. It is original work that suggests a concept that is entirely new to the field.
Secondary theory	An article that builds off a primary theory, but suggests new research direction.
Model	An article that develops a descriptive representation that can be used to characterize a system.
Measurement	An article that collects data (qualitative or quantitative) and draws conclusions directly from that data.
Review	An article that draws conclusions from numerous sources to develop new conclusions and areas for further work.

Table 2-3 lists the seven most commonly cited training topics that Hille & Eseonu (2015) summarized. The review in this dissertation sought articles through the Oregon State University Libraries' Academic Search Premier, Web of Science, and Google Scholar using the search terms *lean training*, *lean education*, and *lean learning*. A total of 27 articles were found.

Table 2-3 Most Cited Training Topics (Hille & Eseonu, 2015)

Training Topic	Definition
Task Analysis	The identification of the nature of the tasks to be performed on the job and the knowledge, skills, and abilities (KSAs) needed to perform these tasks.
Person analysis and individual differences	Addresses who should be trained and what training is needed by an individual
Organizational analysis	Determines where and when training is needed based on an organization's objectives, goals, and resource needs.
Computer-assisted instruction	Instruction complemented with a computer.
Simulation	Training involving the imitation of real-work behavior, processes, or systems.
Cross-cultural training	The assessment of culture as a factor on training.
Evaluation	The systematic collection of descriptive and judgmental information necessary to make effective training decisions related to the selection, adoption, value, and modification of various instructional activities.
Behavior role modeling	Involves learning through observation of a model that utilizes the concepts, rehearsing the procedures by role playing and receiving social reinforcement from the training and other members of the group.

Hille & Eseonu (2015) found that only five out of 72 articles in the training literature from 2009 to 2014 directly referenced lean training methods. In this literature review, the number of papers on lean training from 2015 to 2023 increased to 27, more than five times the amount found from 2009 to 2014. The substantial increase in numbers represents the growing interest in the focus of lean training. Figure 2-2 shows that education and the manufacturing industry are where the studies have mostly been conducted.

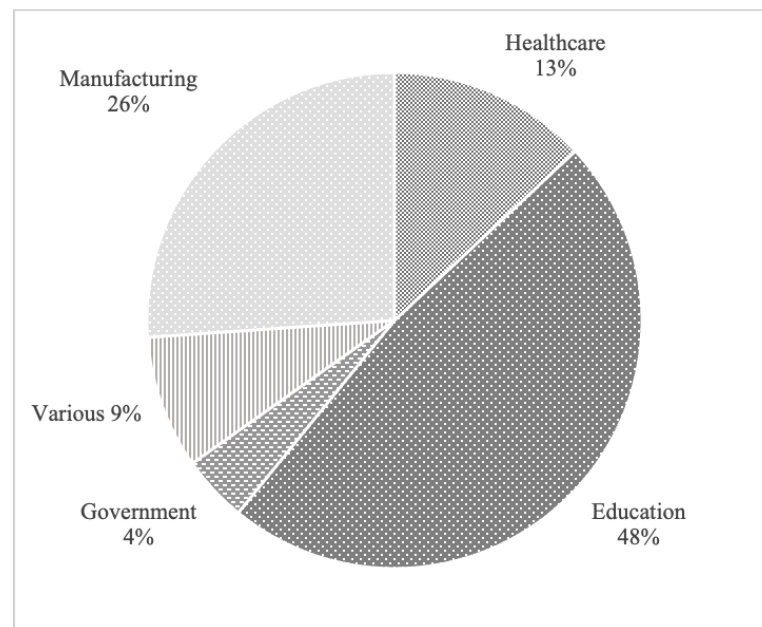


Figure 2-2 Training Lean Articles by Industry between 2015 and 2023 (n=27)

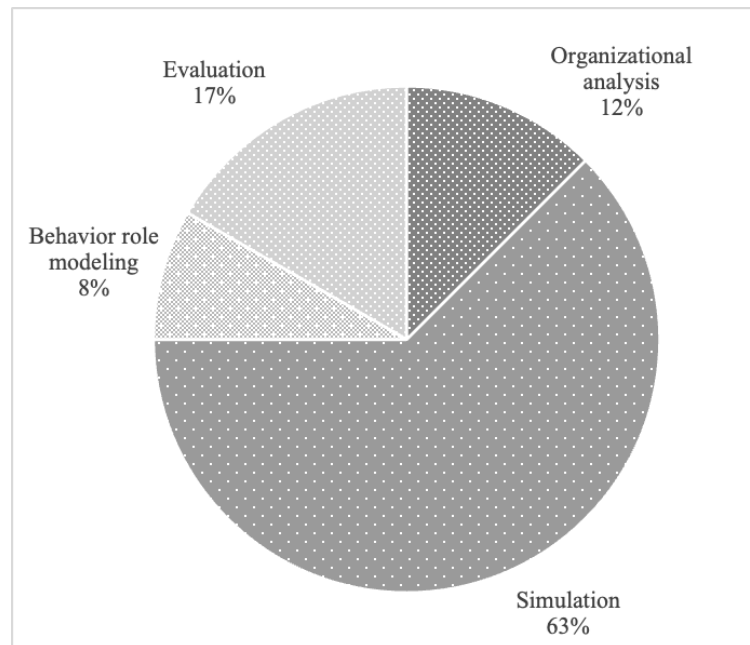


Figure 2-3 Training Topics in Training Lean Literature between 2015 and 2023 (n=27)

Figure 2-3 illustrates that most of the articles focused on simulation techniques. The primary teaching methodology discussed in the simulation articles was Kolb's (1984) theory on experiential learning. Experiential learning is defined as the transformation of experiences into knowledge, and knowledge structures are formed through the continuous interaction of prior knowledge with new experiences. To evaluate learning, most of these papers used Kolb's (1984) learning cycle, which involves four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Concrete experience is the actual experience. Reflective observation is the reflection of the experience. Abstract conceptualization is learning from the experience. Active experimentation is trying out what you have learned.

Non-simulation articles were not present in the lean training literature between 2009-2014 (Hille & Eseonu, 2015). However, after 2015, topics varied, including role modeling, evaluation, and organizational analysis. This represented an interest in designing curriculum or training programs that incorporated what organizational leaders perceived as most important in lean education (Flumerfelt et al., 2016; Lista et al., 2022; Rinke et al., 2015). Of these lean training articles, none used an analysis of trainees' perceptions to guide the training. One article was found to use a customized approach to their training.

Luz Tortorella et al. (2020) identified the various learning styles of students to guide the most appropriate teaching methods (traditional classroom lecture versus problem-based learning) in order to gain wider attention and interest.

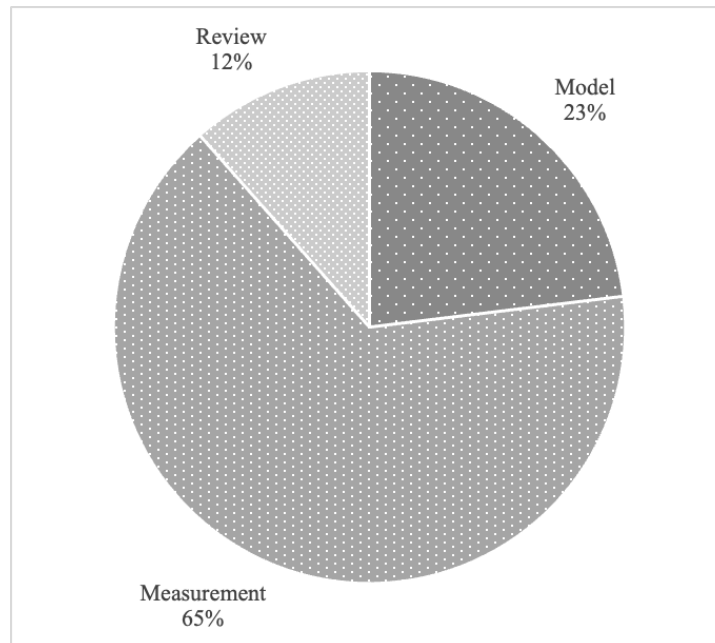


Figure 2-4 Article Category of Lean Training between 2015 and 2023 (n=27)

Figure 2-4 shows that there is a large presence of measurement articles. This is encouraging since Hille & Eseonu (2015) found that the articles on lean training before 2015 were mostly descriptive of simulation techniques and did not collect data. Most of the articles collected data to measure the level of comprehension of lean concepts and performance improvements from the simulations. Mirdad (2018) captured the absorption of Lean concepts by assessing the trainee's transition from a zero/single loop mindset to a double loop mindset. Section 2.3.1. will elaborate further on zero, single, and double loop mindset and behavior, which originated from Argyris and Schön in 1974. Some articles measured other factors, such as the level of student involvement in training (de Castro Vila & Leal, 2017), innovative work behavior (Tan et al., 2023), motivation, and cognitive and social processing (Deif, 2017). However, there is still a lack of research obtaining tangible measurements of results on lean implementation, such as the number of ideas generated, implemented, and brought to fruition (Tan et al., 2023).

To the author's knowledge, no articles measured trainees' perceptions or behaviors to guide the design of lean training sessions. The studies that collected perceptions were limited to self-reported understandings of lean concepts (Adam, Hofbauer & Stehling, 2021; van der Merwe, 2017), willingness to implement lean concepts (Adam, Hofbauer & Stehling, 2021), and level of creative role identity (Tan et al., 2023). This gap in the literature is important since research shows that beliefs and emotions are necessary to gain supportive behaviors (Rafferty & Minbashian, 2019).

Lean training has been studied in the literature and has substantially grown since 2015. However, there is still much to be studied in the lean training literature in terms of incorporating trainees' perceptions of their work environment, behavior, and tangible measurements of training results. The next section will identify how learning and relevant behavior have been studied in lean literature.

2.3 Learning and Lean Implementation

Most organizations do not fully comprehend that the lean system is beyond just making existing processes "lean," but it is supposed to help clarify processes. People can better understand what they do and develop innovative ideas going forward when they can clearly see all the processes (Ballé, Chaize & Jones, 2019). Sustainable improvement in lean programs is most likely to occur when lean implementations are viewed as a process of discovery and learning (Powell & Coughlan, 2020). The highest level of maturity in lean thinking can be reached once an organization is able to maximize learning opportunities for all stakeholders (e.g., managers, staff, customers, suppliers, and even competitors) (Hines et al., 2004). At the individual level, learning occurs when underlying mental models are addressed, leading to fundamentally changing their behavior (Filmore, 2008; Nyström et al., 2018).

Lean thinking uses theories in organizational learning literature. Since lean involves the concept of eliminating waste, many lean articles identified true learning using Argyris and Schön's (1974) theory of action because the theory centralizes error detection and correction. The theory of action and the different types of learning will be discussed in the following section.

2.3.1 Zero, Single, and Double Loop Learning

According to the Theory of Action, everyone and every system has an internal map used to guide their actions (Argyris & Schön, 1974). The theory suggests that individuals intend, hope, or even communicate that they will act a certain way (espoused theory), but often their actions differ (theory-in-use). Argyris (2002) found that espoused theories vary, but the theories-in-use do not. The two theories in use are Model I (single-loop learning) and Model II (double-loop learning). Argyris (2002) defines learning as the detecting and correcting of errors.

Argyris uses governing variables, and behavioral strategies are used to explain the theories-in-use or types of learning. Governing variables are defined as values people attempt to satisfy or keep within an acceptable range. Behavioral strategies are actions people take to satisfy the governing variables.

In single loop learning, errors are corrected without altering the underlying governing variables. Single loop behavior is frequently seen as passionate work, but this passion often causes tunnel vision (Chiva & Habib, 2015). This tunnel vision prevents the ability to see the bigger picture and investigate root causes. Single loop learning inhibits genuine learning.

In double loop learning, the learner corrects errors by changing the governing values, which will subsequently change actions. As a result, double loop learning facilitates genuine learning. Genuine learning occurs when newly acquired knowledge and skills can be used outside the learning environment and under conditions of zero to moderate stress (Argyris, 1976).

Gregory Bateson (1972) identifies five levels of learning. The lowest level of learning, zero learning, refers to little to no reasonable reflection before setting on a belief or action. Learning I is a change in the response by correction of errors of choice within a set of alternatives. Learning II is a corrective change in the set of alternatives from which a choice is made, or it is a change in how the sequence of experience is punctuated. Learning III refers to change beyond the boundaries of the current identity of the individual, group, or organization. Learning IV refers to an awakening of completely new responses or perceptions that open the door to previously unknown and uncharted possibilities. The

third and fourth levels do not occur at the individual level or ‘in any adult living organism’, respectively. Zero loop behavior entails a response to stimuli without making changes based on experience or information (Bateson, 1972). Information is dealt rigidly, resulting in a lack of attention to detail (Langer & Piper, 1987). Individuals will exhibit mindlessness and repeating of past routines (Chiva & Habib, 2015; Cochrane, 2004). Consequently, new information from their environment is not received (Snell & Chak, 1998).

The lack of feedback in zero loop learning disconnects the individual’s mental models from shared mental models, causing a lost opportunity to gain that person’s expertise (Snell & Chak, 1998). When a problem arises, individuals performing zero loop behavior will take no corrective action (Bateson, 1972, Snell & Chak, 1998). Mazur, McCreery & Chen (2012) argue that zero loop behavior does not exist in healthcare because their observations strongly support that healthcare professionals will not let defects occur without doing something. However, this study includes zero loop behavior to see if it exists when answering the research questions. The distinctions between zero, single, and double loop learning are summarized in Figure 2-5.

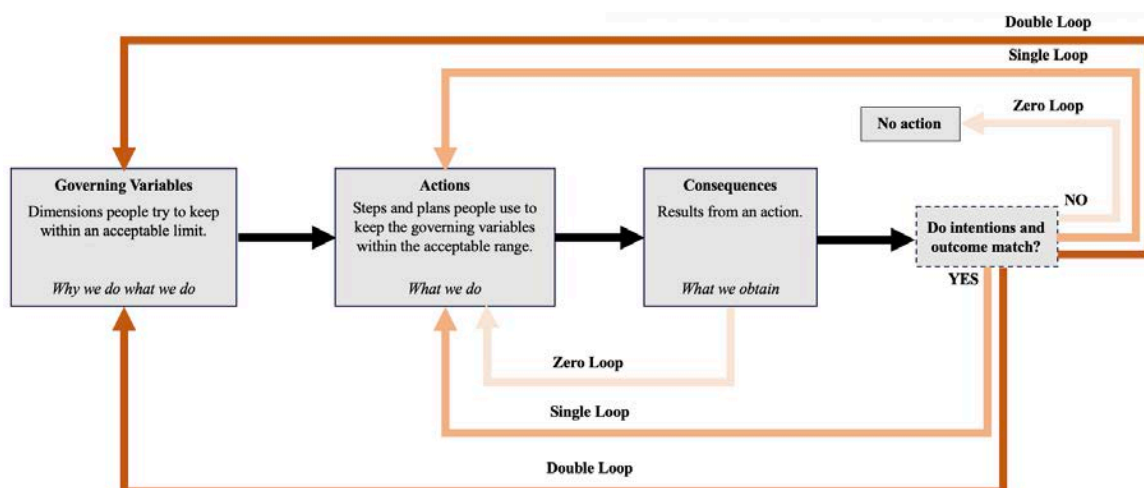


Figure 2-5 The Distinction Between Zero Loop, Single Loop, and Double Loop

In 2012, through observations, Mazur, McCreery & Chen categorized how single and double loop learning would manifest in behavior. In the presence of a defect, individuals who try to rapidly resolve the problem without addressing the underlying issue are exhibiting single loop *quick fixing* behavior. Individuals who try to eliminate the

defect's root cause exhibit double loop *initiating* behavior. When no defects exist, individuals exhibiting single loop behavior will either follow standard procedures (*conforming*) or deviate from standard procedures prioritizing customer service (*expediting*). Individuals exhibiting double loop behavior when no defect exists will look for improvements and begin permanent upgrades (*enhancing*). The improvement behaviors observed by Mazur, McCreery & Chen (2012) and zero loop behavior as defined in the literature are summarized in Figure 2-6. At the cognitive level, the different types of learning are summarized in Table 2-4.

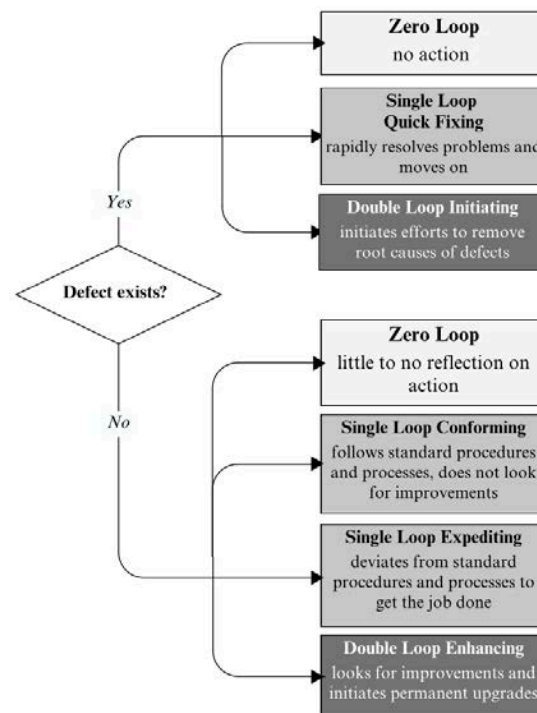


Figure 2-6 Modified Categories of Improvement Behaviors, adapted from Mazur, McCreery & Chen (2012)

Table 2-4 Categories of Learning Mindset, adapted from Mirdad (2018)

Learning Mindset	Cognitive Thinking	Definition (Mirdad, 2018)
Zero Loop	Low	Demonstrates an inability to represent or justify his/her ideas or selections.
Single Loop	Moderate	Demonstrates an inability to explain direct and indirect cause-effect relationships beyond basic, visible symptoms, or to identify and analyze root causes that affect process performance.
Double Loop	High	Demonstrates basic understanding of the concept, ability to rationalize the integrity of knowledge, reasonably describe the real-world application of the concept and recognize the benefits of the concept to their view of the world.

2.3.2 Double Loop Learning in Lean Literature

Double loop learning is arguably the most widely accepted kind of typology to understand organizational learning (Hu et al., 2012). Lean literature acknowledges the importance of double loop learning in Lean implementation. Ballé, Chaize & Jones (2019) argue that learning is the core of the Toyota method; it is more of a cognitive than an organizational approach.

Several articles relate successful continuous improvement to a set of behaviors that cluster around finding and solving problems (Bessant, Caffyn & Gallagher, 2001; Filmore, 2008; Nordin & Sebila, 2017; Gemmel et al. 2018). A review was conducted to identify the trend of double loop learning in the Lean literature through the Oregon State University Libraries' Academic Search Premier, Web of Science, and Google Scholar using a combination of search terms *double loop learning*, *lean thinking*, *lean implementation*, and *continuous improvement*. A total of 79 articles were found.

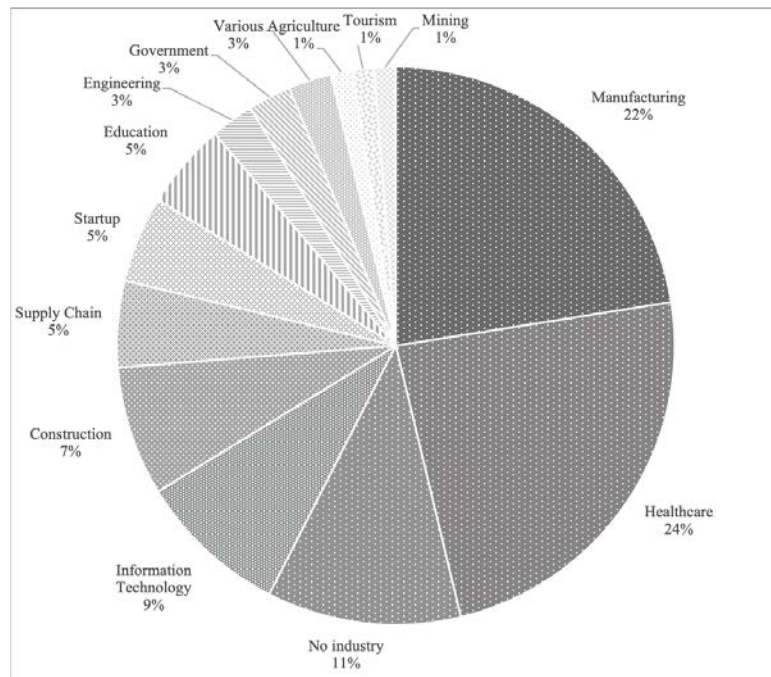


Figure 2-7 Articles by Industry of Double Loop Learning in Lean Literature (n=79)

Figure 2-7 shows that double loop learning has mostly been studied in the healthcare and manufacturing industry. To the author's knowledge, double loop behavior in lean implementation in healthcare was first researched in 2012 (Mazur, McCreery & Chen, 2012; Mazur, McCreery & Rothenberg, 2012) and has increased significantly in the

past decade. Lean articles in information technology and startups started to focus on double loop learning in 2011 and 2016, respectively. Interest in information technology and startups increased recently because of the ambiguity and high-risk nature of the field (York, 2021). Articles in manufacturing, supply chain, and construction started as early as 1996, 1997, and 1998, respectively, and gradually increased throughout the years.

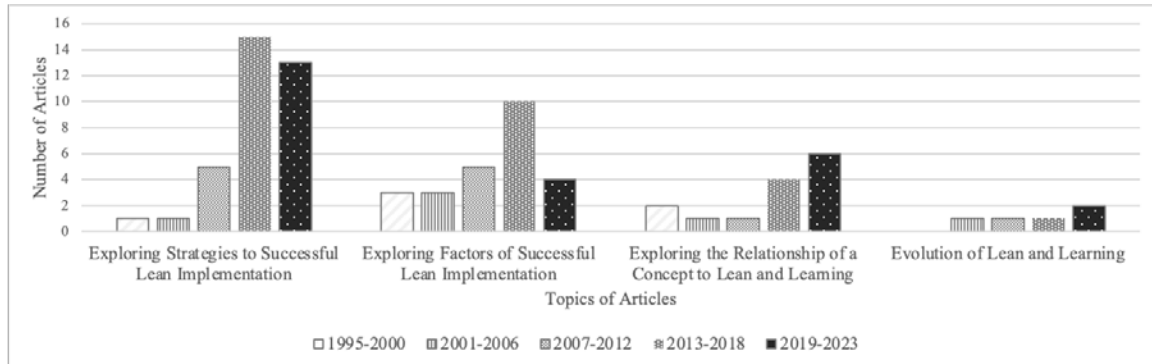


Figure 2-8 Topics on Double Loop Learning in Lean Literature (n=79)

Figure 2-8 present the main topics of interest in the review. Forty-four percent of papers explored strategies to achieve successful lean implementation through methods that either promote the use of double loop learning or suggest ways to achieve it. Papers used double loop learning in lean implementations (Kolawole, Mishra & Hussain, 2021). Double loop learning were used within the tools to use in lean implementations (Antonsen & Bye, 2019). Methods used to achieve double loop learning are further discussed in the following section (2.3.3).

Thirty-two percent of the papers explored factors regarding learning to achieve successful lean implementation. To mention a few, papers identified prerequisites for lean implementation, factors to promote learning through studying the derailment of lean and the impact of varying variables on learning (Bakke & Johansen, 2019; Tortorella et al., 2015; Turesky & Connell, 2010).

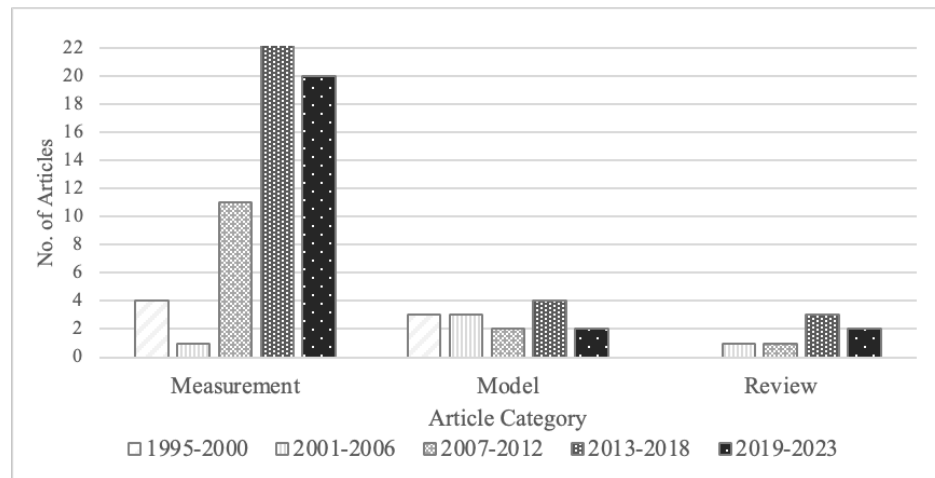


Figure 2-9 Article Category of Double Loop Learning in Lean Literature (n=79)

Figure 2-9 shows the article categories in the review. Approximately 70% of the articles collected data. This represents the maturity of the lean literature itself. Model articles described how organizational learning (Antony et al., 2019; Ballé, Chaize & Jones, 2019; Hirota, Lantelmen & Formoso, 1999; Hu et al., 2016), lean behaviors (Bessant & Francis, 1999; Bessant, Caffyn & Gallagher, 2001; Emiliani, 2003) and individual double loop learning (Mirdad, Hille & Melamed, 2015) can be achieved for successful lean implementation.

The number of model articles, in Figure 2-9 represents the complexity of learning in lean literature. Due to its complexity, learning is evaluated in various ways regarding lean implementation. The review articles evaluated the evolution of lean and learning in various topics such as leadership, production, startups, education, and healthcare (Ashtiani, Bhuiyan & Zanjani, 2017; Machado Guimarães & Crespo de Carvalho, 2014; Hu et al., 2012; Kakouris, Sfakianaki & Tsioufis, 2021; York, 2021). Double loop learning was one of the main definitions of learning in these review articles.

Table 2-5 Concepts Used in Lean Literature to Measure Double Loop Learning (n=26)

Concepts or Variable	Author (s)	Freq.
Theory of Action	Argyris & Schon (1978)	11
Maturity of Lean	Bessant et al. (2001)	1
Lean Thinking	Womack et al. (1990)	1
New Ways of Working	Jaaron & Backhouse (2017)	1
Mental Models	Bagodi & Mahanty (2013)	1
Theory of Accommodation	Posner et al. (1982)	1
OADI-SMM	Kim (1993)	1
Second-Order Problem Solving Actions	Tucker & Edmondson (2003)	1
Understanding & Institutionalising	Schein (2004)	1
Implementation	Reik et al., (2012)	1
Team Learning	Edmondson (1999)	1
Type 1 and 2 actions	Pedler & Abbot (2008)	1
Improvement behaviors	Mazur, McCreery & Chen (2012)	1
Psychological Safety	Mazur, McCreery & Rothenberg (2012)	1
Efficiency & Effectiveness	Drucker (1974)	1
Safety II	Lindvall et al., (2016)	1
Stable Pattern of Modifying Routines	Zollo & Winter (2002)	1
Knowledge Base Article (KBA)	Al-Baik & Miller (2016)	1
Attitude	Doolen et al (2003); Farris et al (2006)	1
Impact on Area	Doolen et al (2003); Farris et al (2006)	1
Task knowledge, skills and attitudes (KSA)	DeVellis (1991)	1

Twenty-six articles measured double loop improvement behavior through various theories and/or variables, as seen in Table 2-5. Most of the articles collected data through interviews and surveys, as seen in Figure 2-10, and most were measured at the organizational level (Figure 2-11).

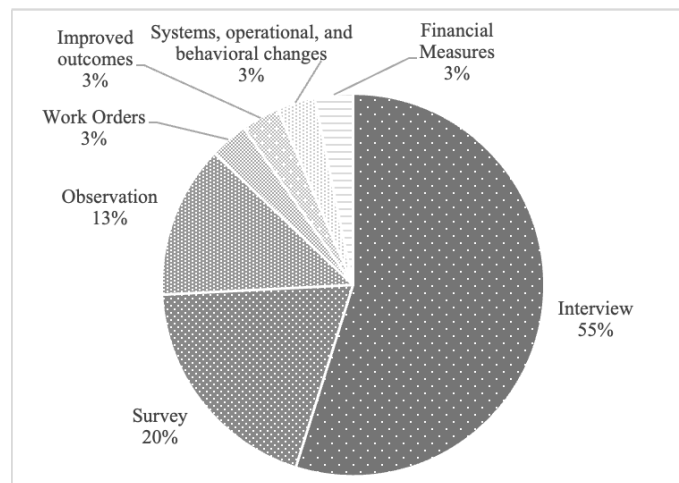


Figure 2-10 Data Collection Methods Used to Measure Double Loop Learning (n=26)

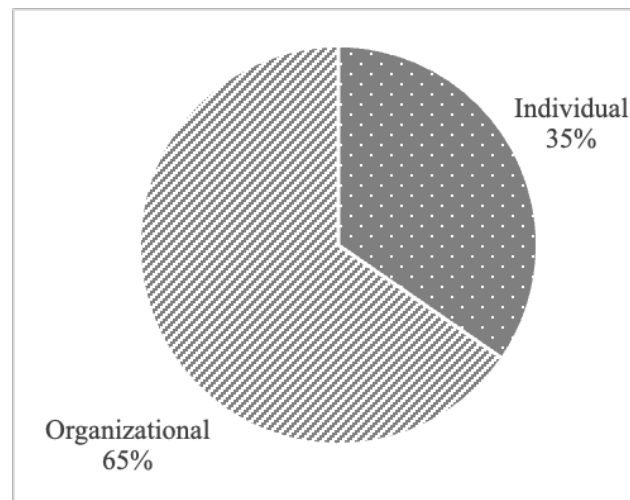


Figure 2-11 Double Loop Learning Measured at the Individual vs. Organizational Level (n=26)

2.3.3 Models Used to Achieve Double Loop Learning

Researchers suggested implementing *certain lean tools* (Antonsen, 2019; Aragon, 2017; Filmore, 2008; Hu et al., 2016; Miller & Maellaro, 2016; Trakulsunti, et al., 2020), *certain program requirements* (Mansoori, 2016; Scott, Butler & Edwards, 2001), *feedback* (Goodridge et al., 2015; Minier, 2014), *gemba walks* (Romero et al., 2020) or *facilitate dialogue* (Al Baik & Miller, 2014; Hansen, 2014; Hansen & Møller, 2016; Messaoudene, 2019) were sufficient in facilitating the use of double loop learning in solving problems. All of these would be possible to incorporate into lean implementations to increase the effectiveness of learning in individuals (Antony et al., 2019; Emiliani, 2003; Mazur, McCreery & Chen, 2012; Mazur, McCreery & Rothenberg, 2012; Pearce & Pons, 2017; Stelson, Hille, Eseonu & Doolen, 2017). These methods aim to achieve proper lean implementation in hopes that the way the individual reflects on their work and internalizes lean is transformed. However, Mazur, McCreery & Rothenberg (2012) argue that this transformation is “not something that an organization can mandate for its employees... it is a person-by-person basis, driven by each individual’s understanding, motivation, abilities, and desire to make constructive change in his/her work environment”.

Mazur, McCreery & Rothenberg (2012) measure individual transformation to identify if someone has become more double loop learning after implementing lean. The

measurement was not a means to guide a trainer in identifying specific factors inhibiting or facilitating the individual to transition to performing double loop improvement behavior.

Other researchers suggest a more hands-on approach to achieving individual or team double loop learning through training (Anand et al., 2009; Bakke & Johansen, 2019; Haukåsen & Hermanrud, 2022; Ingelsson, Bäckstrom & Snyder, 2020; Mirdad, 2018; Mirdad, Hille & Melamed, 2015). Ingelsson, Backström & Snyder (2020) developed a Lean leadership training program model to help the challenge of developing Lean across the organization. They had a top-down and horizontal approach, prioritizing the organization's needs instead of the leaders' needs to guide the training. This approach might have helped spread lean across departments but did not help the leaders gain buy in from those with whom they would most frequently engage — their staff and executive management. At the end of their training, one of the trainees raised concerns about the lack of feedback from executive management on their improvement work but was not addressed by the executive team.

Haukåsen & Hermanrud (2022) also evaluated training to facilitate engagement in lean by emphasizing the human resource department's role in being the 'mindsetter' to motivate lean learning. However, their 'hands-on approach' to change mindsets was using informal dialogue or other trainees to help convince the identified 'sceptic'.

This dissertation argues that there needs to be more preparation before the training so that a more deliberate process can be conducted during training. In addition, individuals have different reactions to lean implementation (Salentijn, Beijer & Antony, 2021), so relying on specific responses during training might not be reliable.

Double-loop learning is hard to achieve because of the lack of a comprehensive understanding of lean concepts (Mirdad & Eseonu, 2015). This was evident in section 2.2.1 when *understanding the applicability of lean* was identified as one of the top critical success factors. In an attempt to facilitate the understanding of lean concepts, researchers made explicit connections between lean concepts, guided by how an individual would build them in their cognitive structure (Novoak & Gowin, 1984) or through a synthesis of literature review and expert surveys (Mirdad & Eseonu, 2015).

The conceptual change model was developed to achieve double loop learning by ensuring that the lean concepts taught in training were understood in a way that the trainees understand not only how it would be applied but also how it would benefit their environment (Mirdad, Hille & Melamed, 2015; Mirdad, 2018). This model is the most comprehensive and the only one found in lean literature to address an individual's cognitive transformation to double loop learning. However, the model does not yet have a methodology to guide the preparation phase of the training, specifically on how to identify the individual's most dominant factors that would inhibit the acceptance of the lean concept. The conceptual change model is further explained in the following section.

Several papers focused on developing methods that prioritized different factors in achieving double loop learning, such as employee satisfaction (Grijalva & Eseonu, 2016), unit supporters, and personal characteristics (Mazur, Stokes & McCreery, 2019). Mazur, Stokes & McCreery's (2019) developed a survey to identify which aspects should be prioritized in future lean implementations but not to specifically guide the training of lean concepts. Mazur, Stokes & McCreery's (2019) also assume the organization already has some form of lean implemented within the organization, making most of the survey dimensions irrelevant if the organization has not yet implemented lean. The purpose of Grijalva & Eseonu's (2016) survey was to guide lean training using employee satisfaction, but it has not yet been used for that purpose. Grijalva & Eseonu's (2016) survey and employee satisfaction will be explored further in section 2.6.

2.4 Conceptual Change Model

Research shows that implementing change is ineffective without changing participants' mindsets (Testani & Ramakrishnan, 2012). Mirdad, Hille & Melamed (2015) developed a model focused on changing employees perception lean concepts. The model combines teaching strategies from REACT (Crawford, 2001) and the Nussbaum & Novick Model (1982) to guide the transition at a cognitive level from single loop to double loop learning based on the conditions for conceptual change identified by the Theory of Accommodation (Posner, Strike, Hewson & Gertzog, 1982).

The acronym REACT stands for *Relating, Experiencing, Applying, Cooperating and Transferring*. These were five teaching strategies used by successful teachers who teach based on individuals' prior knowledge or experience and prioritize experiential learning to confront misconceptions and construct new knowledge (Crawford, 2001). The Nusbaum & Novick model provides clear implementation steps to achieve dissatisfaction with the individual's current concept and seek the correct concept to fulfill the discrepancy (Mirdad, Hille & Melamed, 2015; Nussbaum & Novick, 1982). The Theory of Accommodation postulates that for someone to achieve conceptual change, they need to experience the following stages:

1. **Dissatisfaction** with current concept: Identify that the current concept does not align with relevant facts.
2. Perceive the new concept as **intelligible**: Able to understand the new concept at a basic level.
3. Perceive the new concept as initially **plausible**: Able to reasonably describe how the concept would be applied in the real world.
4. Perceive the new concept as **fruitful**: Recognize that applying the new concept is beneficial to their view of the world.

The model is presented in the following figure.

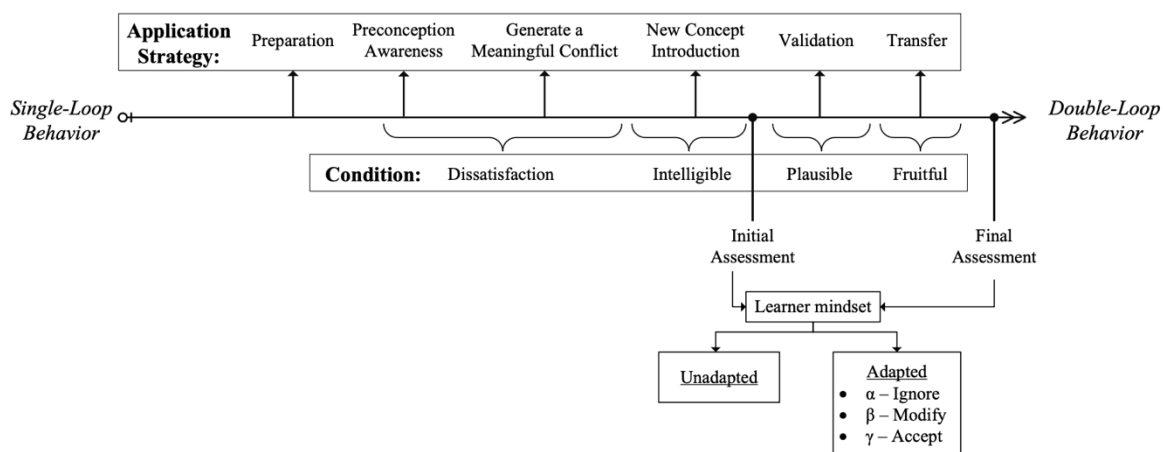


Figure 2-12 The Conceptual Change Model, source: Mirdad, Hille & Melamed (2015)

The six phases of the strategy proposed by the Conceptual Model are explained as follows (Mirdad, Hille & Melamed, 2015):

- 1) **Preparation:** Prepare for the first event by ensuring the environment is suitable to facilitate conceptual change.
- 2) **Preconception awareness:** Encourage trainees to describe their current state and develop a list of pros and cons of the current concept.
- 3) **Generate a meaningful conflict:** make trainees aware of the weaknesses that exist in their preconceptions.
- 4) **New concept introduction:** introduce the new concept as a solution to the deficiencies of their current concept.
- 5) **Validation:** provide time for trainees to discuss how the new concept solves the list of previously identified cons.
- 6) **Transfer:** Map the new concepts to real-world events and experiences.

By addressing preconceptions of lean concepts in training, the conceptual change model aims to achieve double loop behavior by first changing trainees' mindsets to double loop.

The conceptual change model expanded the theory of accommodation from sole dependency on individual cognitive factors to include the consideration of important learning characteristics of the trainee, trainer, and social variables. However, behavior becomes unstable when changes are not made to how the individual understands his/her work environment (Markova, 2009). This dissertation argues that, ultimately, the goal of the training is to ensure that the trainee can go to his/her environment and sustain performing double loop behavior. Therefore, for the concepts taught in training to effectively reach 'plausibility' and 'fruitfulness' to the point where the trainees' behavior fundamentally change, we cannot rely only on the trainees' learning characteristics alone. The trainees' perceptions towards performing double loop behavior in the way they view their world must also be addressed. It is important to address preconceptions of solutions, so trainee preconceptions of performing the proposed behavior should be documented alongside trainee preconceptions of solutions. Making individuals aware of their unconscious preconceptions of their behavior is a crucial first step since individuals might not be aware of their inability to engage in double loop learning (Argyris, 1976). The following sections explore how perceptions can be used to predict future behavior.

2.5 Perceptions and Attitudes

As identified in section 2.2.1 the top critical success factors identified can be categorized as the individual's perception of the work environment. Individuals create

meaning from the events around them and use the interpretation to assemble conceptual schemes (Daft & Weick, 1984). By understanding how individuals translate what happens around them, specifically in relation to why they choose to behave a certain way, we can predict their behavior (Ajzen, 1991). The following section describes the dominant theory to predict behavior in behavioral literature and how it can be applied to help intervene double loop behavior.

2.5.1 Theory of Planned Behavior (TPB)

The theory of planned behavior by Ajzen (1991) was chosen to predict double loop behavior for this research because it is widely used in the social and behavioral science research of this nature (Bosnjak, Ajzen & Schmidt, 2020). As of August 2023, Ajzen's seminal article "*From Intentions to Actions: A Theory of Planned Behavior*" was cited 126,911 times in Google Scholar. The theory of planned behavior was initially design to predict health behavior but it can be used to predict any type of behavior (Fishbein & Ajzen, 1975). This is why it has spread and is the most frequently applied methodology in multiple domains. TPB is the dominant methodology in public, environmental and occupational health, business, and management behavioral domains (Bosnjak, Ajzen & Schmidt, 2020).

Comparing the theory of planned behavior to other theories in the health behavioral domain, the theory of planned behavior is clearly cited with a greater difference (Fig. 2-13). Note that the reasoned action was also created by Fishbein & Ajzen (1975) and is extremely similar to the theory of planned behavior but it does not include perceived behavioral control.

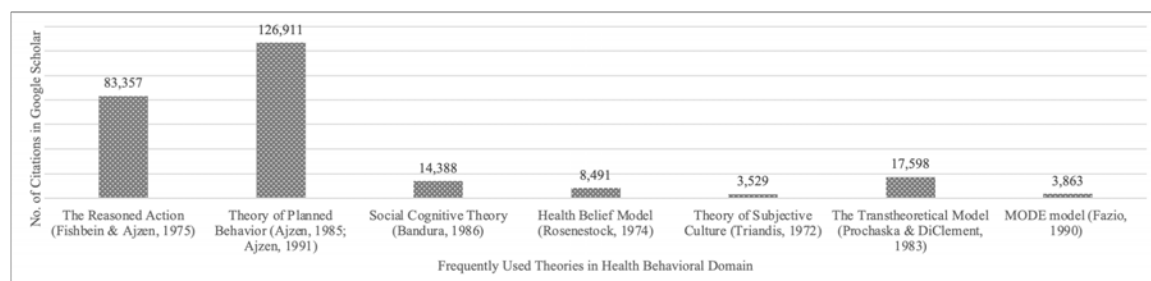


Figure 2-13 Citations in Google Scholar of TPB and Other Theories in Behavioral Domains as of August 2023

According to the Theory of Planned Behavior, human action is guided by three kinds of beliefs:

- 1) **Behavioral Beliefs**: beliefs concerning the consequences of performing the behavior. When aggregated, behavioral beliefs either produce a favorable or unfavorable *attitude toward the behavior*.
- 2) **Normative Beliefs**: beliefs about normative expectations of important people to the individual. When aggregated, normative beliefs produce his/her perceived social pressure (*subjective norm*) to perform the behavior.
- 3) **Control Beliefs**: beliefs about factors that may facilitate or impede the performance of the behavior. When aggregated, control beliefs produce *perceived behavioral control*, which is the perceived ease or difficulty of performing the behavior.

The intention is assumed to be the immediate antecedent of behavior which is a function of attitude toward the behavior, subjective norm, and perceived behavioral control (Ajzen, 1985). The stronger the intention, the more likely the individual will perform the behavior. A favorable attitude and supportive subjective norm provide motivation to engage in the behavior, but perceived behavioral control over the behavior solidifies the intention to perform the behavior (Ajzen, 1985). The Theory of Planned Behavior is summarized in Figure 2-14.

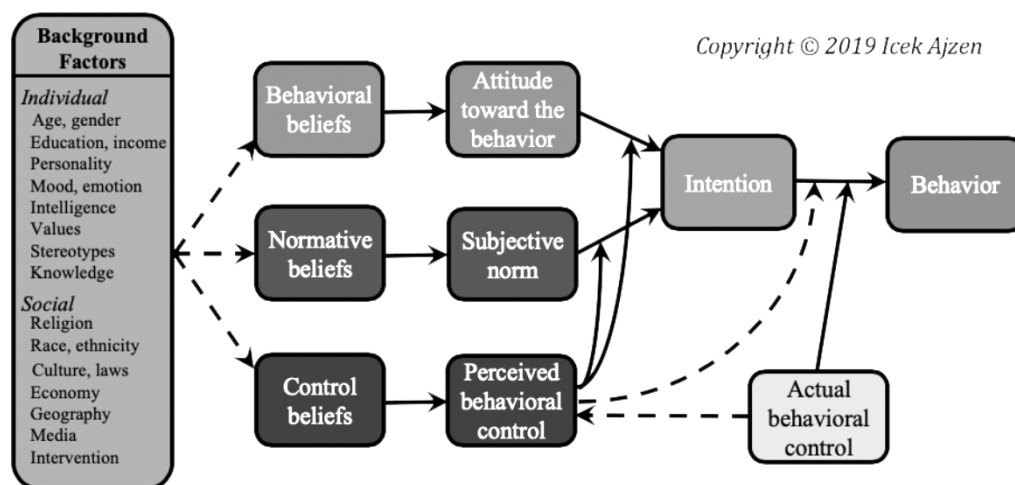


Figure 2-14 Theory of Planned Behavior Model, source: Ajzen (2019)

The significance of any of the three factors (attitude, subjective norm, and perceived behavioral control) in contributing to the prediction of intention can vary on the

behavior or the population (Ajzen, 2002). Fishbein & Ajzen (2011) defines behavior by the action performed, target at which the action is performed, the context in which the action occurs, and the time of occurrence. These four components can also be defined to identify a pattern of beliefs, attitudes, and intentions (Fishbein & Ajzen, 2011). An example of double loop behavior using these definitions could be an employee encounters a typo in an application he/she is processing (target) and suggests a project to eliminate typos in applications (action) during one of the next scheduled (time) weekly huddles (context). Depending on the study, each of these four elements can be defined at varying levels of specificity or generality, even unspecified (Ajzen, 2020). To identify a pattern of behavior, two or more observations of the behavior of interest must have identical levels of generality or specificity of the four components that make up the behavior, as previously described. Fortunately, improvement behaviors, the main interest of this dissertation, have already been defined by Mazur, McCreery & Chen (2012). The theory of planned behavior also states that the behavior will continue to be performed when the intentions and perceptions of behavioral control remain unchanged (Ajzen, 2002). Therefore, the beliefs and perceived control should be identified accurately to help guide trainees' to achieve dissatisfaction and eventually fruitfulness about performing double loop behaviors. The following section explores existing lean literature studying both the Theory of Planned Behavior and double loop learning.

2.5.2 Theory of Planned Behavior and Double Loop Learning

Since this dissertation is interested in using the theory of planned behavior to predict improvement behavior, the researcher conducted a review to identify research articles that applied both the theory of planned behavior and double loop learning in lean. The review was conducted through the Oregon State University Libraries' Academic Search Premier, Web of Science, and Google Scholar using the search terms *theory of planned behavior*, *double loop learning*, and *lean*.

Four papers were found where the author used the theory of planned behavior in their research but only mentioned double loop learning but did not use it in their methodology (Belbacha, 2016; Jenkin, Webster & McShane, 2009; Lloyd, 2000;

Nevalainen, Seikkula-Leino & Salomaa, 2021). In reverse, articles were found to use Argyris' double loop learning in the methodology but only mentioned the theory of planned behavior (e.g., Gomera, Antúnez & Villamandos, 2020). Review articles were found on organization development and change (Tenkasi, 2018), decision making (Jackson, Wood & Zboja, 2012), and adaptation in planning watershed programs (Genskow & Wood, 2009), which included both theory of action and theory of planned behavior as prominent theories. This dissertation was specifically interested in research using the theory of planned behavior to predict double loop behavior. However, not many manuscripts were found that measured the theory of planned behavior and theory of action.

To the author's best knowledge, only two manuscripts collected data using the two theories. Turi et al., (2018) used the theory of planned behavior to predict employees' use of information systems for organizational learning. Monks, Robinson & Kotiadis (2014) measured single loop learning using participants' attitudes toward time utilization in simulation projects. The attitude was guided by the theory of planned behavior. The improvement behavior predicted in this dissertation will use the detection and correction of errors defined by Argyris & Schön (1974) and observed by Mazur, McCreery & Chen, (2012), which has not yet been done in lean literature with the theory of planned behavior.

The theory of planned behavior has been increasingly used as a framework for conducting behavior change interventions (Steinmetz et al., 2016). Interventions were successful when the focus was on groups rather than individuals and in a public instead of private (Steinmetz et al., 2016). Steinmetz et al. (2016) found that the top three most successful behavioral change methods guided by the theory of planned behavior framework were motivation appeals, persuasion, and increasing skills. Motivation appeals encourage self-motivating statements and evaluations of their behavior. Persuasion asserts against a person's self-doubt in performing the behavior. Increasing skills advise how to perform the behavior.

Measuring the belief constructs in the theory of planned behavior allows a better understanding of how to operate interventions specifically to produce the intention to engage. However, belief constructs were rarely measured in the extensive literature when implementing interventions using the theory of planned behavior framework (Steinmetz et

al., 2016). This dissertation argues that using the conceptual change model is the most appropriate intervention strategy. The conceptual change model provides a methodological approach to making the individual aware of their beliefs/preconceptions and then changing them. However, the conceptual change model and the theory of planned behavior have not yet been applied together in the literature. This dissertation will use the theory of planned behavior to measure belief constructs to guide lean training using the conceptual change model by answering the research question: How do perceptions affect employee and manager improvement behavior? The following section explores how employee satisfaction, the most studied attitude in job literature, can be used to help guide lean training.

2.6 Employee Satisfaction

Employee satisfaction is the foundation for workplace attitudes and behaviors because it guides how employees think, feel, and perceive their work (Alegre et al., 2016). When there is an accumulation of unmet expectations, there will be a greater probability of withdrawal behavior (Egan, Yang, & Bartlett, 2004). Research has shown that positive employee attitudes and improved organizational performance are seen when there is system-wide learning (Ju et al., 2021).

The literature on employee satisfaction has been continuously researched since 1930 (Judge et al., 2017). Employee satisfaction is arguably the most important and most frequently researched attitude in the literature, mentioned on average 70% of the time in job attitude literature (Judge et al., 2017). The most significant work in capturing customer's perceived service quality was SERVQUAL (Agarwal, Singh & Upadhyay, 2022). SERVQUAL was modified to SERVPERF which focuses more on a performance based approach to the measurement of service quality (Cronin & Taylor, 1992). However, until Grijalva and Eseonu's work in 2016, the SERVPERF model had not been adapted to measure internal service quality and employee' satisfaction in organizations implementing lean. The next section will explain their survey in further detail.

2.6.1 Modified Service Performance (SERVPERF) Survey

Grijalva (2017) suggested using a modified version of SERVPERF to support the use of the Conceptual Change Model. The tool identifies the work environment and change management factors that influence employee satisfaction to help management identify areas of improvement.

Grijalva and Eseonu's (2016) survey analyzes both overall satisfaction and employees satisfaction with specific aspects of their work. The original SERVPERF survey was modified to include a change management dimension. The five SERVPERF dimensions, the four overall satisfaction questions, and their definitions are listed in Tables 2-6 and 2-7.

Table 2-6 Overall Satisfaction Questions in Modified SERVPERF

Dimension	Question
Overall Satisfaction	I am satisfied with my work at this organization
Net Promoter Score	I would recommend this organization to a colleague/friend (not currently employed at this organization) as a place of employment
Problem Resolution	I am satisfied with the way work related problems are resolved at this organization
Change Management	I am satisfied with the way changes are handled at this organization

Table 2-7 Modified SERVPERF Dimensions

SERVPERF Dimension	Definition
Tangibles	Physical facilities, equipment, and appearance of personnel.
Reliability	Ability to perform the promised service dependably and accurately.
Responsiveness	Willingness to help customers and provide prompt service.
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence.
Empathy	Caring, individualized attention the firm provides to its customers.
Change Management	Change management support as a service provided from management to employees.

This survey has not yet been used alongside training using the conceptual change model. This dissertation aims to use this survey to study if change in improvement behavior affects employee satisfaction.

2.7 Summary of Literature Review

The preparation phase is the most important phase of the continuous improvement implementation (McLean et al., 2015). This dissertation argues that achieving an effective conceptual change to accepting and engaging in double loop behavior requires a systematic methodology of predicting improvement behavior along with their underlying beliefs and identifying which areas of improvement to prioritize through employee satisfaction.

This chapter identified literature gaps in the lean and learning literature, which this dissertation aims to fill. The gaps and significance of the gaps are summarized in Table 2-8.

Table 2-8 Summary of Identified Gaps and Their Importance

Identified Gaps	Importance
The training lean literature has not yet used trainees' perceptions towards behavior and work environment in training.	Perceptions towards behavior and work environment are critical in gaining employee engagement in lean improvements.
The conceptual change model's preparation stage does not include the trainees' perceptions about behavior.	Identifying dominant improvement behaviors and perceptions towards dominant behaviors provides a higher likelihood of effectively changing trainees' behavior.
The theory of planned behavior has not yet been applied to predict improvement behaviors.	Theory of planned behavior is the leading theory in predicting and changing behaviors. Using the theory of planned behavior to change improvement behaviors is assumed to be beneficial in theory and practice.
Satisfaction has not been directly tied to improvement behaviors and used to guide training in lean literature.	Employee satisfaction can reflect a variety of internal and external factors as perceived by the employee. The ability to identify satisfaction that reflects perceptions towards dominant improvement behaviors provides a useful guide in deciding what aspects of the work environment to prioritize.

3 Research Methodology

This chapter begins with the introduction of the study organization. The research design, the types of data collected, and data analysis are described for each research question. A discussion of how research bias was addressed for both research questions is also included. The chapter concludes with a summary of the methodologies used for this research.

3.1 Case Study Overview

This dissertation is a study on how to sustain improvement initiatives and effectively implement employee behavior interventions. This research performed a case study to understand the relationship between factors that encourage/discourage improvement behaviors. A single case study “provides a much more persuasive argument about causal forces than broad empirical research” and a deeper understanding of the phenomena (Siggelkow, 2007). An exploratory case study is most suited to understanding relationships between improvement behavior, mindset, driving perceptions of behavior/mindset, and employee satisfaction (Strauss & Corbin, 1994; Yin, 1994).

The researcher in the case study took on the role of a “participant-as-observer” (Babchuk, 1962) and served as one of two participant-as-observers, actively collecting data, participating in conceptual change based training, interpreting and coding the data as part of a larger team. The study lasted for approximately two years. Research participants were employees within the study organization, including the two participant-as-observer research team members. Management informed participants that the researchers were present in the organization to help with issues the organization was experiencing.

3.1.1 Study Organization

The study took place in a United States-based governmental service organization (Organization O). Organization O consists of various departments that worked together to provide services related to recreational boating throughout the state, including education, enforcement, access, and environmental stewardship.

Department Selection

The registration department is critical to the organization, having the most extensive customer interaction and collecting 40.3% of the organization's revenue. The registration department is the face of the organization, as customers contact the registration department to gain and process information on customer's water vehicles. Therefore, the registration department provided the best opportunity for improving the organization's customer service and profits.

Registration Department Composition and Responsibilities

The registration department receives applications in four different ways: mail, walk-ins, online, and agents. Agents are certified boat dealerships who register customer boats as a convenience. Agents make up most applications, encompassing approximately 50% of titles received. Applications through mail are the second highest submission method.

The registration process starts when an application is received by the department and ends when a title is generated. The researcher documented each step of the application process through discussion with every member of the registration department. The research team identified the tasks, noted in Figure 3-1, for each application type (mail/walk-ins, online, agent):

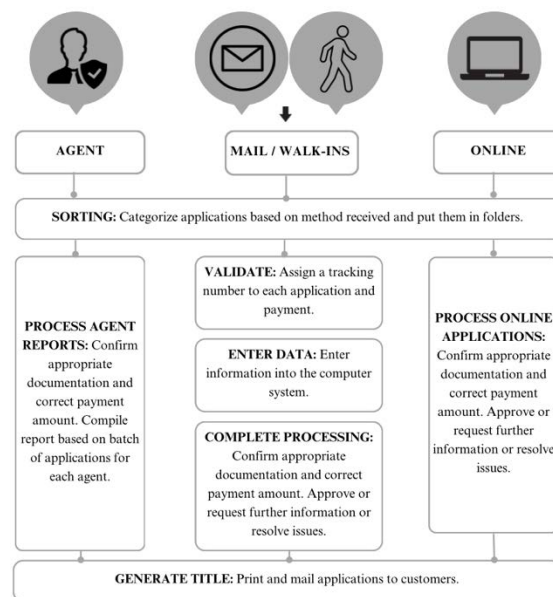


Figure 3-1 Tasks for Each Application Type

The registration department consists of 10 employees: one manager, one team leader, five public service representative four (PSR4) employees, two data entry employees, and one receptionist. PSR4 employees have the authority to complete all parts of the registration process; they have the certification and expertise to review and modify applications. Data entry employees are limited to sorting, data entry, and title generation. The receptionist's role is to greet customers and enter data from walk-in customers. Figure 3-2 depicts the organization's reporting structure, with details of the registration department noted.

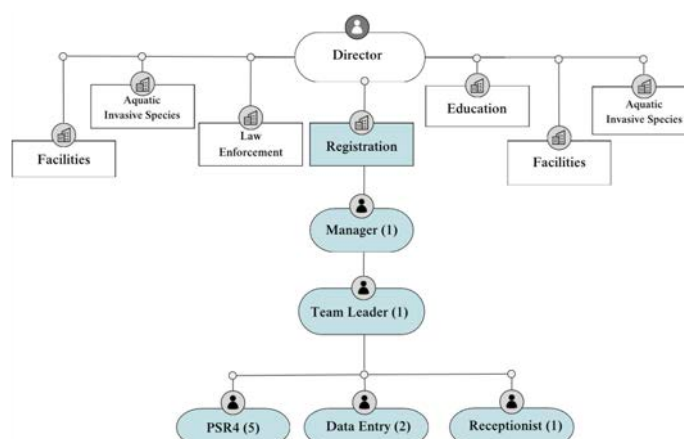


Figure 3-2 Departmental Structure of Organization O and the Registration Department

The department receives applications throughout the year, but there are two periods in which they receive the majority of applications. The first period is during the boating season (April-September). The second is in November, as the department sends out renewal coupons with registration renewal reminders. Figure 3-3 summarizes application numbers by month from January 2017 to December 2018. These two periods will be referred to as the two peak service periods throughout this dissertation.

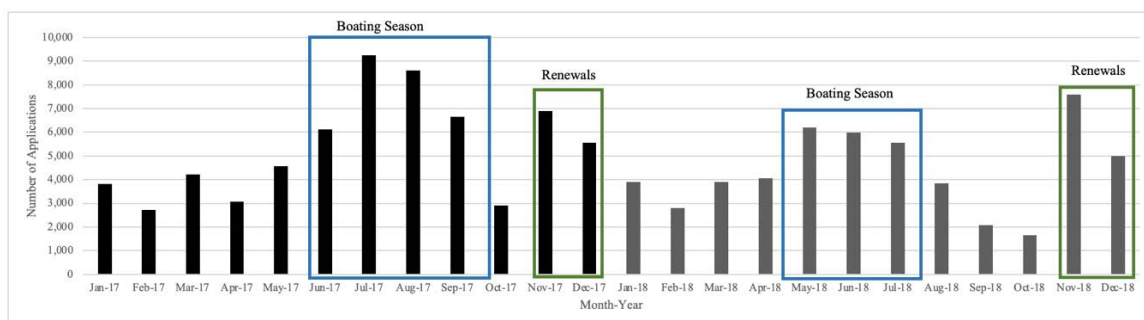


Figure 3-3 Registration Department Demand from January 2017- December 2018

3.1.2 Study Organization's Main Problem

The registration department faces a significant backlog in registration processing, despite increased reliance on temporary workers and the introduction of a new processing system. This backlog resulted in increased customer complaints.

Organization O transitioned from a DOS-based registration processing software to a more general-purpose system in 2014. The vendor conducted training for employees in the registration department. Due to the numerous issues resulting from the new software, the department had over two months of backlog at the time of the research team's arrival.

Based on customer survey results shown in Figure 3-4, customer satisfaction dropped significantly, from 95% to below 80%, after the introduction of the new system in 2014.

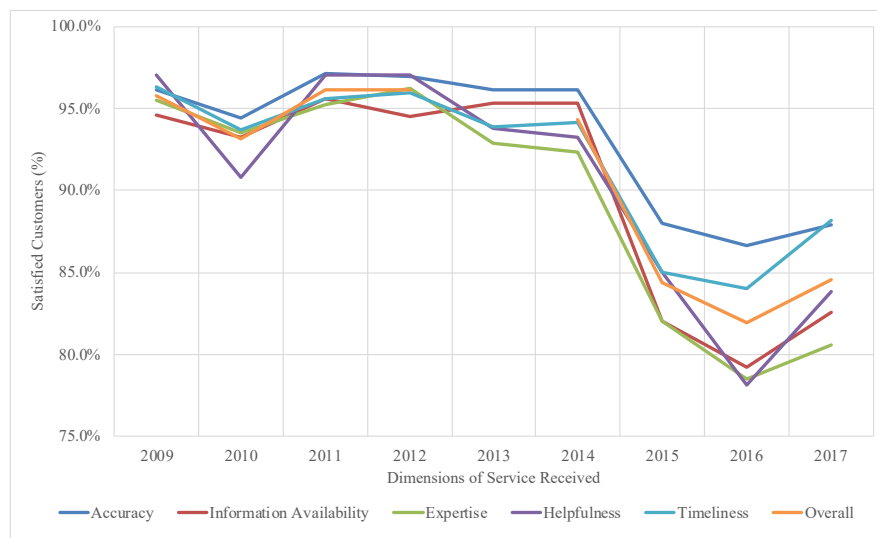


Figure 3-4 Customer Satisfaction Trend from 2009 to 2017

The registration department stated that the backlog was mostly due to the data entry processing and requested more data entry staff. The director was faced with the question, *'Is there a way to increase registration department capacity other than adding more staff?'*. This question led the director to engage with the research team to implement lean conceptual change based training and created an opportunity for the research team to study improvement behaviors and mindset and to determine factors influencing behavior, and employee satisfaction.

3.1.3 Research Questions

The research questions guiding the study are:

1. **Research Question One (RQ1):** How do perceptions affect employee and manager improvement behaviors?
2. **Research Question Two (RQ2):** How is change in employee and manager improvement behaviors represented in satisfaction?

3.2 RQ1

Research question one (RQ1) is, “*How do perceptions affect employee and manager improvement behavior?*” To answer this question, the research team created a conceptual framework to guide the analysis.

3.2.1 RQ1 - Conceptual Framework

The conceptual framework created for RQ1 is a broad outline of how perceptions, based on the theory of planned behavior, influence improvement behaviors and mindset. Improvement behaviors are improvement behaviors the employee/manager mentioned in the interviews as performing in the past. An improvement mindset is a measure of an employee’s system knowledge and the ability to assess system health/effectiveness for a desired outcome through interviews. These definitions for improvement behaviors and mindset are derived from Mazur et al. (2012). Figure 3-5 summarizes the conceptual framework for RQ1. Definitions for the constructs and variables shown in the RQ1 conceptual framework are provided next.

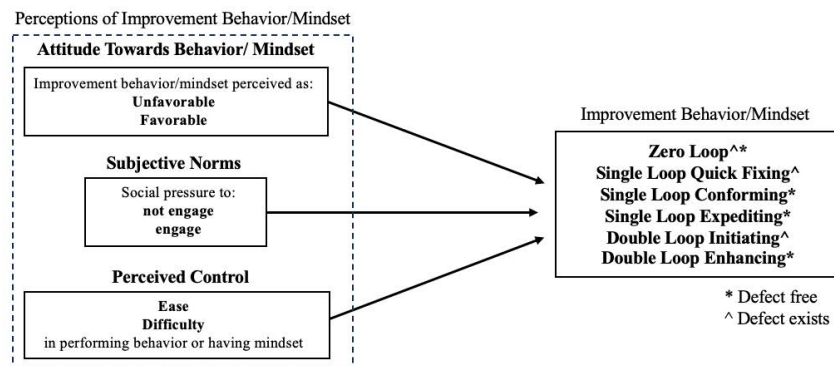


Figure 3-5 Conceptual Framework for RQ1

3.2.2 RQ1 – Definitions

Table 3-1 summarizes the definitions and types of perceptions of improvement behavior and mindset for RQ1.

Table 3-1 Perceptions of Improvement Behavior/Mindset for RQ1

Perceptions	Definition of the Perceptions
Attitude Towards Behavior/ Mindset	An accumulation of readily accessible beliefs regarding the likely consequences of performing the behavior or having the mindset, under consideration. Perceived consequences are categorized as either favorable or unfavorable.
Subjective Norm	An accumulation of perceived social pressure to engage or not engage in performing the behavior or having the mindset, under consideration.
Perceived Control	An accumulation of readily accessible beliefs concerning factors that either facilitate or impede performing the behavior or having the mindset, under consideration.

Fishbein & Ajzen (2011) argue that the degree to which people have actual control over their behavior, the more likely the person will perform the behavior. Actual control of the behavior depends not only on the ability to overcome barriers but also on the presence of facilitating factors such as past experience or assistance (Ajzen, 2020). Perceived control in this dissertation can be assumed to be actual control since improvement behavior was defined by past behavior, especially when it is agreed upon by eight people and confirmed by other sources of evidence.

For this study, defect presence, or absence, is the basis for improvement behavior categorization. A defect is “a condition in which the individual is attempting to perform a task and needs something that is unavailable or defective, and/or something is present that should not be present, resulting in a failure to execute the task as intended” (Mazur et al., 2012). A defect-free condition is “one in which an individual is attempting to perform a task for which everything needed is available, and nothing significant is present that should not be present” (Mazur et al., 2012). The task can be performed as designed and intended and is referred to as a normal pace condition. Table 3-2 summarizes improvement behavior categories for RQ1. Table 3-3 summarizes improvement mindset categories for RQ1.

Table 3-2 Improvement Behavior for RQ1 and RQ2

Levels of Learning	Categories of Improvement Behavior/ Mindset	Behavior		
		Continues to perform standard procedure?	Takes actions that corrects defect or addresses immediately visible system inefficiency?	Initiates efforts to make long-lasting system improvements?
Zero Loop	No Action [^]			
	No Reflection*			
Single Loop	Quick Fixing [^]			
	Conforming*			
	Expediting*			
Double Loop	Initiating [^]			
	Enhancing*			

[^] = Defect Exists

* = Defect-Free

Dark Gray = No

Light Gray = Yes

Table 3-3 Improvement Mindset for RQ1 and RQ2

Levels of Learning	Categories of Improvement Behavior/ Mindset	Mindset		
		Shows functional knowledge of work tasks?	Shows ability to assess system health/ effectiveness given desired outcomes?	Shows ability to provide solutions for long-lasting improvements?
Zero Loop	No Action [^]			
	No Reflection*			
Single Loop	Quick Fixing [^]			
	Conforming*			
	Expediting*			
Double Loop	Initiating [^]			
	Enhancing*			

[^] = Defect Exists

* = Defect-Free

Dark Gray = No

Light Gray = Yes

3.2.3 RQ1 – Data Collection Details

For RQ1, the research team collected data before the training and twenty months after the training. The researcher conducted the following steps to answer RQ1:

1. Identified type and the driving perceptions of past improvement behaviors for each employee and manager group.
2. Categorized improvement behaviors for the employee and manager group.
3. Determined the dominant employee improvement behavior as the improvement behavior/mindset with the highest sum for the employee and manager group.
4. Collected and regrouped all perceptions of the dominant improvement behavior.
5. Repeated steps 1-4 and identify the dominant type of improvement mindset.
6. Analyzed how the improvement behavior, mindset, and perceptions of behavior/mindset changed from before training to 20 months after training.

Analyzing improvement behavior/mindset and the perceptions of behavior/mindset was not completed directly after training. This research was done in collaboration with Mirdad (2018), who focused on participant mindset during each phase of conceptual change-based training. After the training, Mirdad (2018) determined that all individuals demonstrated double loop learning mindsets associated with the use of huddles. Huddles are ten to fifteen minute standing meetings at the beginning of the workday (Scoville et al., 2016). The registration department embraced the huddles concept as a method to bring up issues and solve them and 5S and Poka Yoke on the application process to reduce waste in data entry . Since huddles were going to be the primary method of solving problems, it was assumed that all the department members in the near future would display double loop behavior.

The research team conducted final data collection twenty months after training to assess the extent to which members of the registration department sustained improved behavior. The registration department needed sufficient time after training to experience applying the tools and concepts learned in various settings (e.g., peak demand, interacting in huddles with coworkers or managers). Twenty months was determined based on research findings that the impacts of Kaizen training tend to last no longer than two years (Higuchi, Nam, & Sonobe, 2015) and that half of process improvement projects backslide one year after successful implementation (Holweg, Staats, & Upton, 2018). This research assessed the extent to which registration department employees and managers retained double loop learning behaviors resulting from the initial training.

3.2.4 RQ1 – Data and Analysis Details

The researcher collected data from interviews, field notes, and documents. Figure 3-6 summarizes the data collection methods for research question one. The researcher used interviews, supported by notes from training observations and huddle reports to identify improvement behaviors, mindset, and perceptions of the behavior/mindset. The researcher also used process observations, customer satisfaction data, and demand data to provide researchers with more context of the department's condition.

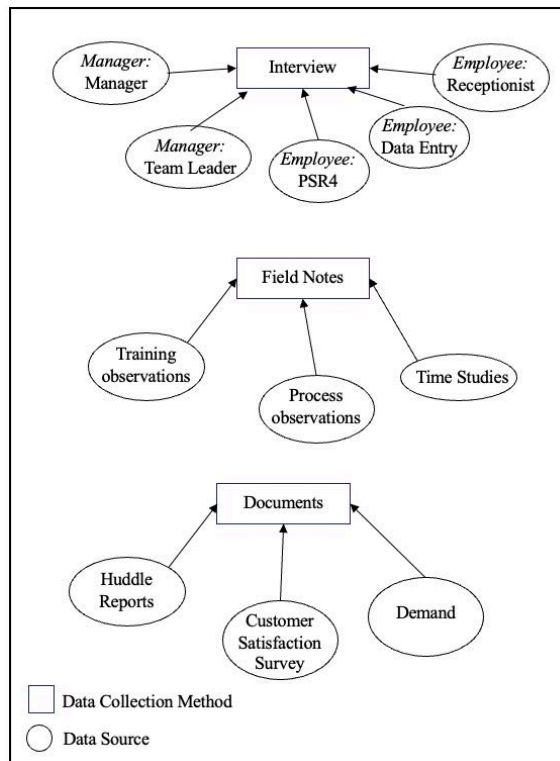


Figure 3-6 RQ1 - Data Collection Approach (Adapted from Worley, 2005)

3.2.4.1 Interviews

The aim of the interviews was to determine the interviewee's pattern of improvement behavior, improvement mindset, and perceptions of the behavior/mindset. The researcher also collected perceptions for not engaging in double loop behaviors/mindset over other behaviors/mindset to identify factors that prevented employees from performing or maintain double loop behaviors. The interviewer asked participants to provide honest recollections of their daily operations and experiences but did not tell participants that their beliefs were used to predict their improvement behavior.

The participants were not also asked to validate the categorizations of their behavior, to avoid social desirability effect.

The best way to gain insight is to have direct interviews that are more fluid than rigid (Rubin & Rubin, 2011; Saldana, 2016; Weiss, 1995). The researchers used a general interview guideline to make sure the interviews extracted details related to improvement behaviors, mindsets, and perceptions of behavior/mindset while being flexible enough to support each interviewee process (Yin, 2004). The questions and the purpose of each question are summarized in Table 3-4 and were used by the interviewer to ensure that the research goals were achieved.

Table 3-4 Interview Guideline

#	Questions	Purpose of Questions	Data Collected
1	[Introduce self]	Gain interviewee's trust.	
2	What is your name?		Name of interviewee.
3	How long have you been working in the organization?	Get to know interviewee.	Interviewee's work experience in organization.
4	What tasks are you responsible for in the department?		Position in the registration process.
5	Can you walk us through the registration processes. From when you receive an application till it is complete?	Find out all the steps in the process from the participants. Ensure all interviewees are on the same page with the process. Surface the whole process in their memory before asking them to refer to problems in the process. Spark recollection of issues in the process.	All the processes performed in the registration department.
6	What is the most common complaint you receive from your customers?	Identify issues from the customer's perspective. Encourage them to look from the customer's perspective.	Customer complaints.
7	If you had all the money and authority, how would you solve the top three challenges mentioned above?	Identify what the interviewee thinks are the top three important issues. Identify how the interviewee would solve the issues independent of hindering factors.	Interviewee's priorities and preconceptions of solutions.
8	How have you solved the challenges so far?	Identify type of improvement behavior.	Predicted improvement behaviors.
9	Why did you select that approach?	Identify perceptions that drove their behavior.	Attitudes towards behavior, subjective norms, and perceived behavioral control of improvement behaviors performed and not performed.
Encourage interviewee to bring up issues they encountered:			
10	How do/did you solve the issue?	Identify their improvement behavior based on past actions or suggestions.	Identify their improvement behavior based on past actions or suggestions.
11	What do you think should be done?	Identify how the interviewee would have solved the issues.	Preconceptions of solutions.
12	Why did you select that approach?	Identify perceptions that drove their behavior.	Attitudes towards behavior, subjective norms, and perceived behavioral control of improvement behaviors performed and not performed.

All interviews began with the first group of questions, questions one through seven. The interviewer asked the remaining questions in the order that allowed the conversation to flow naturally. The interviewers asked additional questions as needed. The interviews were scheduled to last for approximately one hour. The length of time depended on the

amount of information the participant was willing to share. The next section will discuss coding details and data analysis details used for interview data.

3.2.4.1.1 Coding and Qualitative Analysis

The research team coded interview data. According to Miles and Huberman (1994), coders can assign codes to words, sentences, or paragraphs for analysis (the process through which meaning is derived from the coded responses). The research team used deductive and inductive coding to analyze semi-structured interviews. Deductive coding uses a predefined set of codes, derived from theory or from a literature review to assign codes to narrative data. Inductive coding is developed from concepts and themes found in the data analysis completed by the researcher through reading and interpreting the raw data. For deductive coding, the research team created a provisional list of codes based on the conceptual framework. For inductive coding, the researcher must be open to what the study data presents rather than force-fitting the data into preexisting codes.

The research team used Otter.ai software to transcribe interview recordings. Figure 3-7 provides an illustrative example of transcribed notes. Transcriptions of the interview can be simultaneously read and listened to, enabling the researcher to identify transcription errors and to understand general themes. The research team saved the complete transcriptions in Microsoft Word. Next, the research team highlighted and labeled relevant excerpts with a code specific to the employee, using Excel. Employee names were also coded. The research team saved employee codes in a separate Excel file to maintain confidentiality. Employee codes were position-based. The manager, team leader, and employees were coded as M1, M2, and E1-E8, respectively.

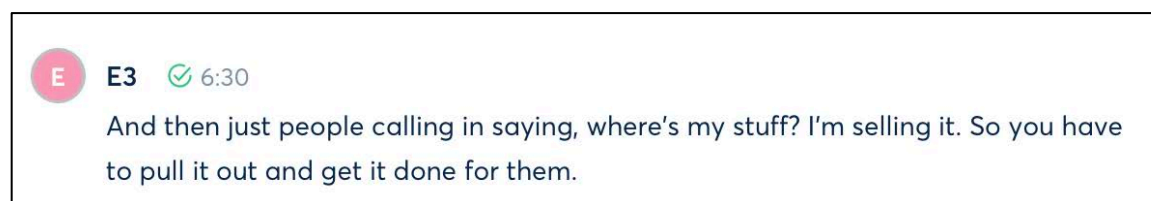


Figure 3-7 Screenshot of Excerpt in Otter.ai

Coding resulted in 3,678 pieces of coded evidence. An example of interview coding is shown in Figure 3-8.

Excerpt from Interview with E3		
Just people calling in saying where's my stuff, I'm selling it. So you just have to pull it out and get it done for them.		
Breaking up Excerpt		
Just people calling in saying where's my stuff, I'm selling it. // So you just have to // pull it out and get it done for them.		
Coding		
Non-defect	Perception towards behavior	Improvement behavior
Just people calling in saying where's my stuff, I'm selling it.	So you just have to	pull it out and get it done for them.
Customer	Subjective Norm –Engage [Department]	Single Loop - Expediting

Figure 3-8 Example of the Process of Coding an Excerpt from an Interview

To interpret and analyze the data, several methods were used. Yin (2017) defined two methods: pattern matching and explanation building. Pattern matching is a methodology that uses a pattern or theory to predict an outcome. If the pattern of results is as predicted, it strengthens the research proposition. Another method is explanation building, an iterative process to compare results from the data with initial propositions, subsequently revising the proposition. Factoring is the third method and “makes patterns of patterns or categories of categories” (Miles & Huberman, 1994).

The researcher calculated the sum of each type of improvement behavior for each individual before training and twenty months after training. A behavior was identified as dominant if the behavior had the greatest frequency of occurrences mentioned in the interviews. A mindset was identified as dominant if the mindset had the greatest frequency of occurrences of engagement in the interviews.

The training was completed in a group setting, but since everyone has different experiences, there is no guarantee that everyone in the registration department would have the same dominant improvement behavior. In addition, trainers are unable to address individual perceptions during the training. The researcher decided to divide the registration department into two groups; manager and employee. The type of improvement behavior

with the highest sum for each group was defined for this study as the dominant improvement behavior for the group. The same was done when identifying the dominant mindset. Table 3-5 displays an example of how to determine the dominant behavior prior to training. Before training, most employees expressed performing single loop conforming behavior.

Table 3-5 Example of Determining Dominant Employee Improvement Behavior

Employee	Zero Loop	Single Loop			Double Loop	
		Conforming	Quick Fixing	Expediting	Enhancing	Initiating
E1		5	2	4	1	
E2		7	1		3	
E3	1	15	1	2	1	
E4		10	5	6	4	
E5		6	6		1	
E6		6	4	3	3	1
E7	1	10	5	8	3	4
E8	2	9	15	6	4	1
Total	4	68	39	29	20	6

Fishbein & Ajzen (2011) defines behavior through four components: 1) the *action* performed, 2) the *target* at which the action is performed, 3) the *context* in which the action occurs, and 4) the *time* of occurrence. Since the employees work in close proximity to each other, employees will most likely encounter the same target and perform the same actions within similar contexts and times therefore are more likely to have the same type of improvement behavior. Managers have different roles, authority, and daily actions/tasks from employees, so managers are analyzed separately. Any improvement initiative that comes out of training needs to be agreed upon by all members participating in the training. Before the training, the trainers were aware of individuals with different dominant improvement behaviors from the group and facilitated opportunities for these employees to go through conceptual change, including variations in seating, and encouraging participation and dialogue throughout training.

3.2.4.2 Field Notes

The researcher wrote observations in a notebook during training and when studying the processes performed in the registration department. The researcher transcribed the

notes into Microsoft Word. The researcher added information or context to the notes if stimulated by a memory of events during transcription. The researcher saved the excerpt codes and the assigned sources in a Microsoft Excel file. Figure 3-9 presents an example of how the notes were categorized into codes.

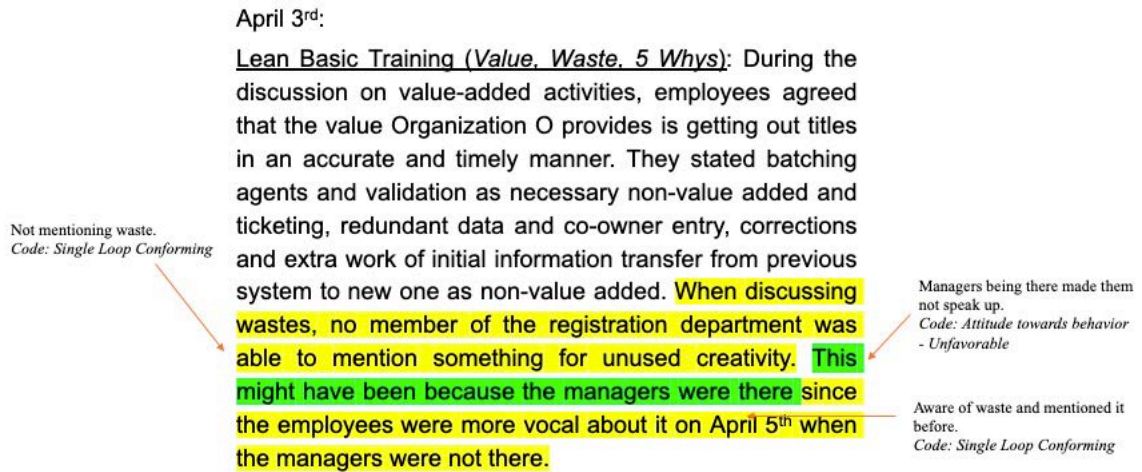


Figure 3-9 Example of Coding of Field Notes

3.2.4.3 Time Studies

The main issue experienced by the registration department was a significant backlog. The organization's main goal was to improve the time to process an application to the point that either the backlog was reduced or eliminated. The research team analyzed changes in the processing time of applications at the end of the study to see one of the ways the department benefitted from the training. The research team used pre and post-training time studies to assess the extent to which the process had improved. Understanding the registration process also provided additional context to the work environment and interactions between registration department employees.

3.2.4.4 Documents

The registration department provided the research team with customer satisfaction results and demand data. Data were also collected through huddle forms and reports. The registration department had no regular meetings of any type before the research team arrived. Therefore, data obtained from any type of meeting, specifically huddles, were only

available after the training. Huddle forms were only used right after training since employees and managers later eliminated them and modified how huddles were performed. The registration department employees initially used the form in Figure 3-10 to record ideas and track execution.

Improvement Opportunities		
Description _____		

Name _____	Date _____	Time _____
Suggestion _____		

Who _____	What _____	When _____
_____	_____	_____

Figure 3-10 Huddle Forms

Any time a registration department employee had an idea or identified an improvement opportunity and wanted the department to discuss it during the huddles, the employee would fill out the huddle form and post it on the upper left section of the huddle board named “Problem/Idea/Opportunities” as shown in Figure 3-11.



Figure 3-11 Initial Huddle Board

The registration department team would then discuss each form during the huddles and put the form in one of five sections:

- a. *Possible*: the idea has low impact and does not require a lot of resources.
- b. *Implement*: the idea has a high impact and is easy to execute.
- c. *Challenge*: the idea has a high impact but is difficult to execute.

- d. *Kibosh*: the idea is rejected because, after discussion with other members, the target issue was no longer considered a problem.
- e. *Parking Lot*: the idea requires further discussion or information. The registration department will return to it later, when the needed information becomes available, or the time is more convenient.

During the huddle, the registration department employees move idea forms to the “Done” section once an issue is considered resolved.

The registration department later decided to change the layout and use of the huddle board as shown in Figure 3-12. The registration department decided to eliminate the use of huddle forms. If anyone wanted to discuss anything, the person would write it down in the upper left section named “New”, which would be discussed in the huddles. The registration department would then move the problem/solution to “Needs follow-up” and come back to the issue in the next huddle. The “Work in progress” section showed the backlog of each method of applications received. A date would mean that the last application the registration department processed was on that date, and a backlog existed from that date to the current huddle date. A note of “current” meant there was no backlog.

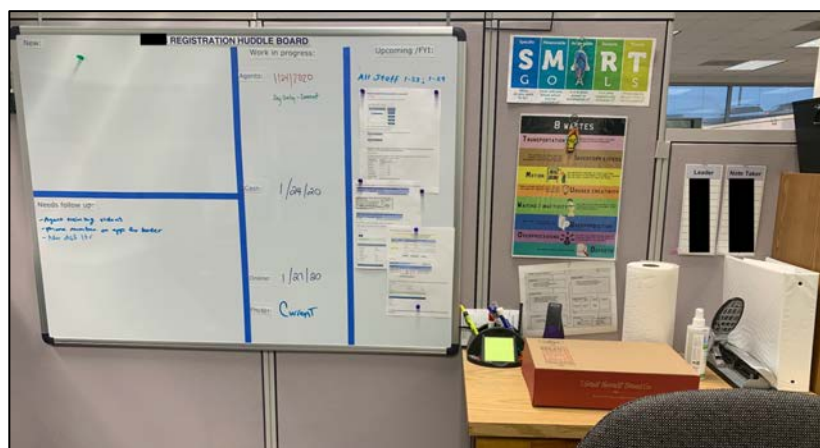


Figure 3-12 New Huddle Board

The registration department employees created and distributed summary huddle results to the whole registration department. The huddle reports included an “announcements” section. The report did not include names of responsible parties or initiators for each idea. Reports also did not always identify who was involved in the problem /solution dissolutions. The huddle reports were not concerned with who brought

up problems but rather focused on what solutions were identified to solve the problems. It seemed more important to the department to write down who was in charge of implementing solutions, since names were more frequently written down in these instances.

As a result, the research team could not determine the employee who generated a specific idea. The research team could also not categorize solutions by improvement behaviors. Figure 3-13 is an example of the huddle report coding. The following definitions were used to categorize huddle reports:

1. *Suggested Ideas*: a topic that is brought up that requires a reaction, whether it is an agreement, suggestion, or solution.
2. *Implemented ideas*: completed tasks, agreements, suggestions, or solutions to a problem.
3. *Announcements*: statements that provide information to everyone about individuals, departments, or organizations.

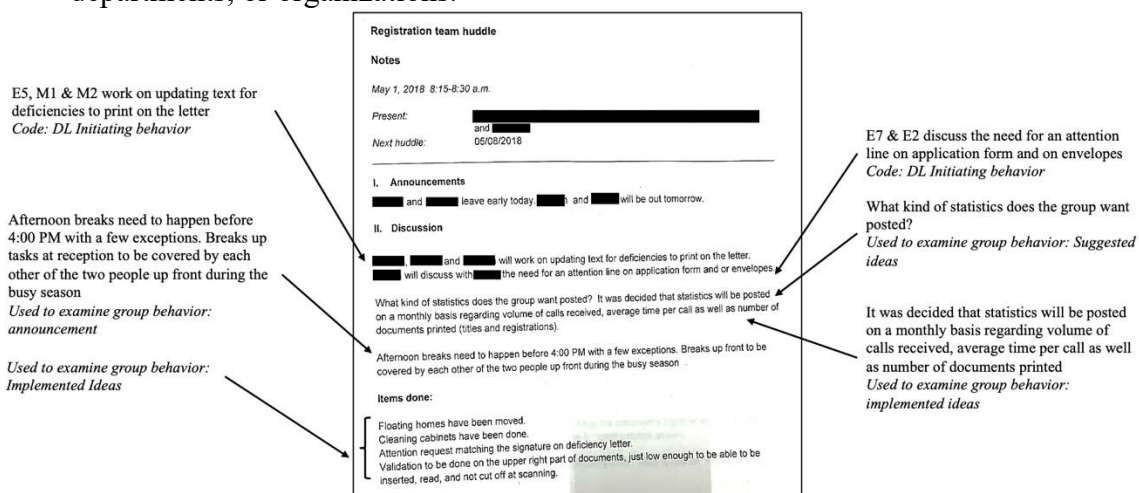


Figure 3-13 Example of Huddle Reports Coding

The researcher decided it was not possible to track individual improvement behaviors or mindset over time through the huddle reports because the registration department team did not regularly include the names of those who suggested ideas or those who executed the ideas. However, the information was still used to evaluate how the group behaved over time in the huddles based on the discussed topic, categorized into suggested, implemented ideas, and announcements. The data helped assess how improvement behaviors changed over time.

3.2.5 RQ1 - Addressing Bias

One limitation of a qualitative research approach is the potential for bias by the research team. Mays and Pope (1995) summarize qualitative research limitations as an assembly of anecdotes and personal impressions that lack reproducibility and generalizability, as well as generating large amounts of data about a number of small settings. Mays and Pope (1995) further explain that it is difficult to claim that a researcher ‘can in any sense capture the literal truth of events.’ They argue that the strategy of qualitative research should be to create an account of the method and data so that another trained researcher can come to the same conclusions and provide an explanation that withstands scrutiny. When the prime objective is to understand social processes instead of statistical representativeness, obtaining a random or representative sample from a population is not a useful approach.

This study aims to understand what drives improvement behavior in an organization. The objective of the organization is to improve customer satisfaction, and positively impact revenue for the organization. By including all members of the department as study participants, the sample is considered theoretically informed and relevant to the research questions. Having the department population as the sample population minimizes possible bias in selecting a sample based on convenience or other methods.

To ensure retest reliability the research team outlined and followed meticulous interview documentation and analysis protocols. The reliability was also enhanced through an independent assessment of transcripts by other qualitative researchers and comparing the agreement between raters (Mays & Pope, 1995). The research team ensured concept validity through “triangulation” of evidence from different, independent sources (Mays & Pope, 1995; Miles & Huberman, 1994).

3.3 RQ2

Research question two (RQ2) asked, “*How is change in employee and manager improvement behaviors represented in satisfaction?*” The researcher used a qualitative approach to answer RQ2. The research team coded, based on the satisfaction dimensions defined by the modified SERVPERF survey, the perceptions of the dominant behavior

identified in research question one. The researcher then conducted a qualitative analysis to assess the relationship, if any, between employee satisfaction dimensions from the modified SERVPERF survey and the most frequently performed improvement behaviors. The researcher defined improvement behavior/mindset and perceptions of behavior/mindset in the conceptual framework.

3.3.1 RQ2 - Conceptual Framework

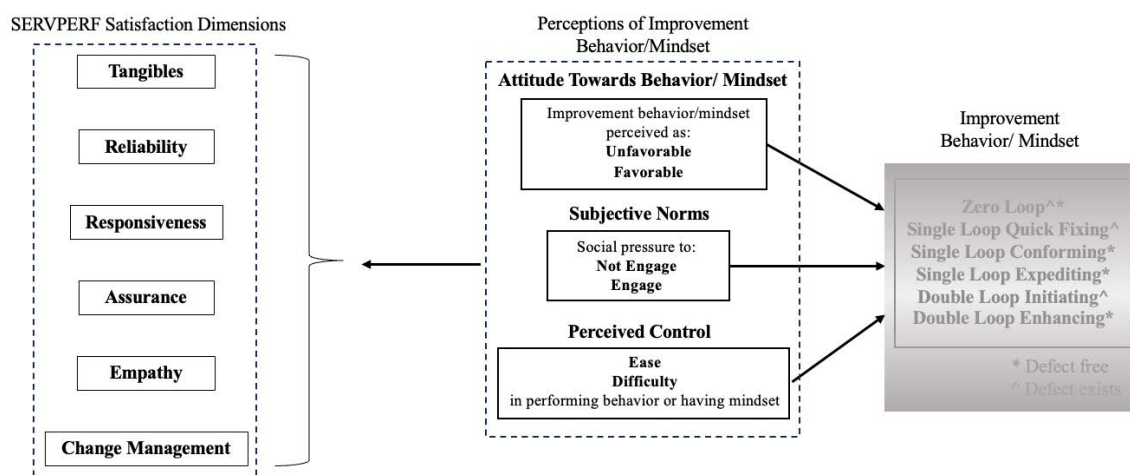


Figure 3-14 Conceptual Framework for RQ2

Figure 3-14 depicts the relationship between satisfaction and improvement behavior. The research team coded perceptions of the dominant improvement behavior, determined from RQ1, based on the six constructs defined by the modified SERVPERF survey. The research team used the same measurements before and twenty months after training to assess the extent to which registration department employee satisfaction changed.

3.3.2 RQ2 – Definitions

Table 3-6 summarizes the perceptions of improvement behavior/mindset. Table 3-7 summarizes the satisfaction definitions used to code perceptions. The satisfaction definitions were based on the modified SERVPERF survey items.

Table 3-6 Perceptions of Improvement Behavior/Mindset for RQ1

Perceptions	Definition of the Perceptions
Attitude Towards Behavior/ Mindset	An accumulation of readily accessible beliefs regarding the likely consequences of performing the behavior or having the mindset, under consideration. Perceived consequences are categorized as either favorable or unfavorable.
Subjective Norm	An accumulation of perceived social pressure to engage or not engage in performing the behavior or having the mindset, under consideration.
Perceived Control	An accumulation of readily accessible beliefs concerning factors that either facilitate or impede performing the behavior or having the mindset, under consideration.

Table 3-7 Modified SERVPERF Survey Dimensions and Survey Items for RQ2

Modified SERVPERF Dimensions	Code to Represent Survey Item	Survey Items Used to Measure Dimension
Tangibles	Neatness	Employees at this organization dress neatly
	Equipment	This organization has modern looking equipment
	Materials	Service related materials at this organization are visually appealing
	Technology	This organization is equipped with up-to-date technological tools
	Process-knowledge	I feel confident that I can describe the entire process at this department
	People-knowledge	I feel confident that I can identify the people involved in each stage of the entire process at this department
Reliability	Problem resolution	Supervisors/administrators show sincere interest in resolving problems when they (problems) occur
	Service accuracy	Employees perform services right the first time
	Procedure accuracy	Employees generally perform error-free procedures (e.g. data entry, validation, reports, etc)
	Task completion	Employees at upstream or downstream services/procedures tell me exactly when their tasks (that I need for my work) will be completed
	Records accuracy	Records are accurate and up-to-date at this organization
Responsiveness	Promises	When supervisors/administrators promise to do something by a certain time, they do it as promised (changes, implementations, improvements)
	Service promptness	When needed, employees from other departments/teams provide prompt service to me
	Assistance	When needed, employees from within the department are always willing to help
	Availability	When needed, employees are rarely too busy to respond to my requests/provide timely feedback
Assurance	Courtesy	All staff & administrators are consistently courteous
	Psychological safety	I feel safe while performing work tasks
	Confidence	Overall, employees in my department behave in a way that instills confidence in me
	Knowledge	Staff & administrators from other departments/teams have the knowledge to answer my questions
Empathy	Attention	Managers in my department give personal attention to their employees
	Operating hours	My organization's operating hours are convenient for employees
	Needs	Managers in my organization understand employees' specific needs
	Interests	Management in my organization has employees' best interests at heart
	Performance	Quality performance in my organization is facilitated by a safe and healthy environment
Change Management	Pace	When a change is needed, managers implement it at a pace that allows employees to easily adjust
	Collaboration	My department promotes staff collaboration and support
	Training	Management at my organization provides effective training for employees
	Recognition	Management at my organization values and recognizes my work
	Learning	My organization allows its employees to learn to increase their independence and responsibility
	Communication	My organization has effective communication between all employees

3.3.3 RQ2 – Data Collection Details

Employee satisfaction was collected using the data from the interview responses collected before training and twenty months later.

For the supplemental analysis to understand how satisfaction changes using MUSA, the modified SERVPERF survey was distributed to employees and managers three times: before training, eight months after training, and twenty months after training. The department went through two peak service periods in the eight-month period after the training event. Peak service periods provide employees with high contact with customers and other members of the organization. Existing literature suggests that the volume of work and proximity to the customers and other members of the organization could become an opportunity for employees to hone skills they have learned, and for management to invest time in employees (Loerzel, 2014).

3.3.4 RQ2 – Data Details

In addition to the interviews, the researcher distributed the modified SERVPERF survey. Figure 3-15 presents the survey layout for the first four questions in the survey. The research team kept survey responses confidential by replacing participant names with respondent IDs and concealing IDs in a separate file. The files were kept in a separate folder and only available to researchers. The research team shared the identified result summaries with the organization. The research team handled data in accordance with Oregon State University IRB approved number IRB-2019-0355.

How long have you been working in this organization?

☐ Less than 6 months
☐ 6 months - 1 year
☐ 1 - 3 years
☐ More than 3 years

Thinking of [NAME OF ORGANIZATION], what are the top three challenges employees like you face during their daily tasks?

Challenge 1
 Challenge 2
 Challenge 3

How would you solve the top three challenges mentioned above, if you had a million dollars?

Solution to Challenge 1
 Solution to Challenge 2
 Solution to Challenge 3

We often think of value as something I provide for which a client is willing to invest (financially). What is value to your internal clients?

Figure 3-15 Survey Layout for the First Four Questions in the Survey

Survey question one provided data on participant tenure with the organization. The next two questions focus on improvement opportunities. Each participant was asked to list the top three work related challenges they faced, alongside potential solutions to each challenge. The researcher wanted to understand how each participant viewed their work, process, and their organization's value proposition. Consequently, in the next question, the team asked each respondent to define the value they provided to internal clients.

There are seven sections in the modified SERVPERF survey (1 - Overall Satisfaction, 2 - Tangibles, 3 – Reliability, 4 – Responsiveness, 5 – Assurance, 6 – Empathy, 7 - Change Management). The overall satisfaction questions from the first section are displayed in Table 3-8. Table 3-9 is an overall definition of the SERVPERF dimensions of sections two through seven of the survey which guided the coding of interview responses.

Table 3-8 Structure of Overall Satisfaction Questions

Dimension	Question
Overall Satisfaction	I am satisfied with my work at this organization.
Net Promoter Score	I would recommend this organization to a colleague/friend (not currently employed at this organization) as a place of employment.
Problem Resolution	I am satisfied with the way work related problems are resolved at this organization.
Change Management	I am satisfied with the way changes are handled at this organization.

Table 3-9 Modified SERVPERF Dimension Definitions

SERVPERF Dimension	Definition
Tangibles	Physical facilities, equipment, and appearance of personnel.
Reliability	Ability to perform the promised service dependably and accurately.
Responsiveness	Willingness to help customers and provide prompt service.
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence.
Empathy	Caring, individualized attention the firm provides to its customers.
Change Management	Change management support as a service provided from management to employees.

The survey used a seven-point Likert scale for each SERVPERF item (1 = “strongly disagree”, 2 = “disagree”, 3 = “slightly disagree”, 4 = “neither agree nor disagree”, 5 = “slightly agree”, 6 = “agree”, 7 = “strongly agree”). The survey was built with multiple questions for each dimension of the work environment, to ensure internal consistency. Minor modifications were made to the survey so it was more relatable to the participants, specifically two words in the survey were changed: ‘healthcare facility’ to ‘organization’.

Minor modifications in wording to the context are effective and acceptable and do not affect the integrity of the scale (Parasuraman et al., 1991).

3.3.4.1 RQ2 - Qualitative Data Analysis

The research team used the modified SERVPERF survey items to code the perceptions of the behavior/mindset. An example is shown in Figure 3-19. The researcher arranged the coded satisfaction from the perceptions as attitude towards behavior/mindset, subjective norm, or perceived control.

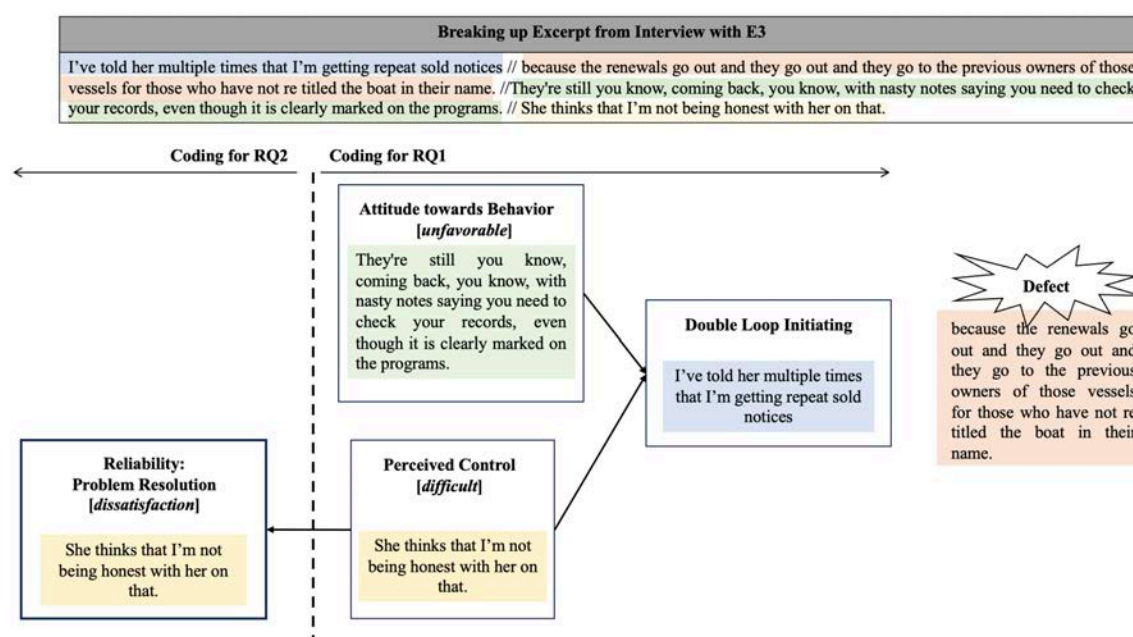


Figure 3-16 Example of Coding Satisfaction from Perceptions of Dominant Improvement Behavior

Figure 3-16 emphasizes how the improvement behavior and perceptions driving the behavior were coded to answer research question one. Double loop initiating was driven by the employee's attitude and perceived control of performing double loop initiating behavior. From the perceptions identified, when possible, satisfaction was coded based on the SERVPERF survey items. In the Figure 3-19 example, perceived control was translated to dissatisfaction in reliability — problem resolution.

Table 3-10 presents an example of how the increase in satisfaction and dissatisfaction is evaluated based on attitude toward behavior. The highest increase in satisfaction and dissatisfaction is highlighted in yellow. Satisfaction in change

management, specifically collaboration increased from zero before training to six after training. This increase in satisfaction indicates how the employees viewed favorable outcomes from performing double loop enhancing compared to when they were performing single loop conforming is reflected in the increase of satisfaction. Dissatisfaction with reliability, specifically problem resolution, increased from three before training to seventeen after training. This increase in dissatisfaction indicates how the employees viewed unfavorable outcomes from performing double loop enhancing compared to when they were performing single loop conforming is reflected in the increase of dissatisfaction.

Table 3-10 Example of Employee Satisfaction Based on Attitude Toward Behavior

		Attitude Towards Behavior			
		Unfavorable		Favorable	
		Before: SL Conforming	After: DL Enhancing	Before: SL Conforming	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance	3			
	Promises	1	1		
	Service promptness				1
Subtotal		4	1	0	1
Change Management	Collaboration	4	5		6
	Pace	2			
	Communication	4		1	1
	Recognition	2	2	1	1
	Learning		1		
	Training				
Subtotal		12	8	2	8
Empathy	Performance	4	1		
	Needs		4		
Subtotal		4	5	0	0
Tangibles	Technology	4		3	
Subtotal		4	0	3	0
Assurance	Psychological safety	2			
	Courtesy	5	3		
	Subtotal	7	3	0	0
Reliability	Problem resolution	3	17		1
	Task Completion				
Subtotal		3	17	0	1
Total		34	34	5	10

3.4 Supplemental Analysis Details

Due to the small sample size (10), descriptive statistics are more appropriate to analyze registration department employee satisfaction data. The researcher compared all

satisfaction dimensions during three data collection periods. The researcher also used MUSA as an evaluative and prescriptive approach to aid in determining the critical dimensions of employees' jobs and can be used to improve job satisfaction. MUSA uses non-linear value functions of employee global satisfaction that depend on a set of service characteristic dimension variables to prescribe specific areas that require action for improvement (Grigoroudis & Siskos, 2002). MUSA uses four parameters to analyze the results:

Satisfaction levels, S (global) and S_i (partial), taking values between 0 and 1 (0-100%).

$$S = \frac{1}{100} \sum_{m=1}^{\alpha} p^m y^{*m}, \quad (\text{eq. 1})$$

$$S_i = \frac{1}{100} \sum_{m=1}^{\alpha} p_i^k x_i^{*k} \quad \text{for } i=1,2,\dots,n \quad (\text{eq. 2})$$

p^m and p_i^k are the frequencies of employees. y^m is the global satisfaction level of m^{th} employee. x_i^k is the i^{th} criterion of k^{th} satisfaction level.

Relative weight of each criterion, p_i , between 0 and 1 (0-100%)

Demanding indicator, D_i , between -1 and +1 (-100 to 100%)

$$D = \frac{\sum_{m=1}^{\alpha} \left(\frac{100(m-1)}{\alpha-1} \right) - y^m}{100 \sum_{m=1}^{\alpha} \frac{m-1}{\alpha-1}} \quad (\text{eq.3})$$

where α is the number of satisfaction levels and y^{*m} is the value of satisfaction level y^m .

Impact indicator, I_i , between 0 and 1 (0-100%)

$$I_i = p_i(1 - S_i) \quad (\text{eq.4})$$

The main advantage of MUSA is that it provides a visual representation for decision making through action and improvement diagrams. The action diagram maps the satisfaction dimensions that should be improved based on the perceived performance compared to the perceived importance of the dimension (Figure 3-17). The organization's performance in providing a satisfactory work environment and perceived importance of individual work facets for employees are obtained through the combination of criteria weights and satisfaction indices. The four action diagram quadrants are status quo, transfer resources, leverage opportunity, and action opportunity. When a satisfaction dimension

falls in the status quo (*low performance/low importance*) quadrant, the dimension is not perceived as important to employees and the organization has poor performance with the dimension, so there is no need for the organization to make improvements in the satisfaction dimension. Satisfaction dimensions in the transfer resources (*high performance/low importance*) quadrant indicate that current efforts on the dimension are better allocated to other dimensions that are more important. Satisfaction dimensions in the leverage opportunity (*high performance/high importance*) quadrant indicate that the dimension is a competitive advantage to the organization since the dimension makes the organization an attractive place for employees. Satisfaction dimensions in the action opportunity (*low performance/high importance*) quadrant indicate that the dimension needs the most attention because it is important to employees and the organization's performance in the dimension is low.

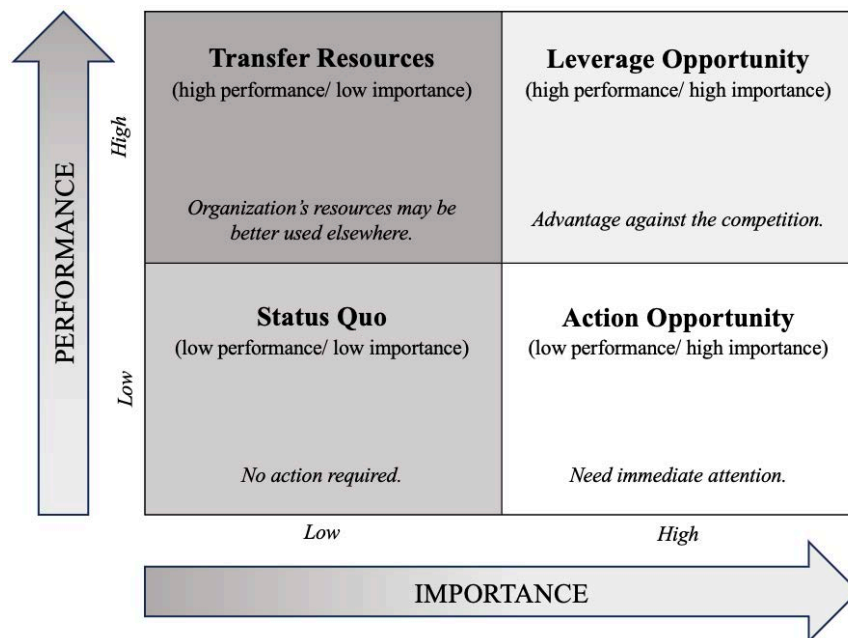


Figure 3-17 Action Diagram (Grigoroudis & Siskos, 2002)

The improvement diagram maps the satisfaction dimensions into one of four quadrants, based on the extent of the improvement effort needed (demanding) on the dimension and the size of the improvement margins possibly gained (effectiveness) from making improvement on the dimension (Figure 3-18). High effectiveness means improving the satisfaction dimension will result in high improvement margins when improvements

are made. High demanding means improving the satisfaction dimension will require substantial effort.

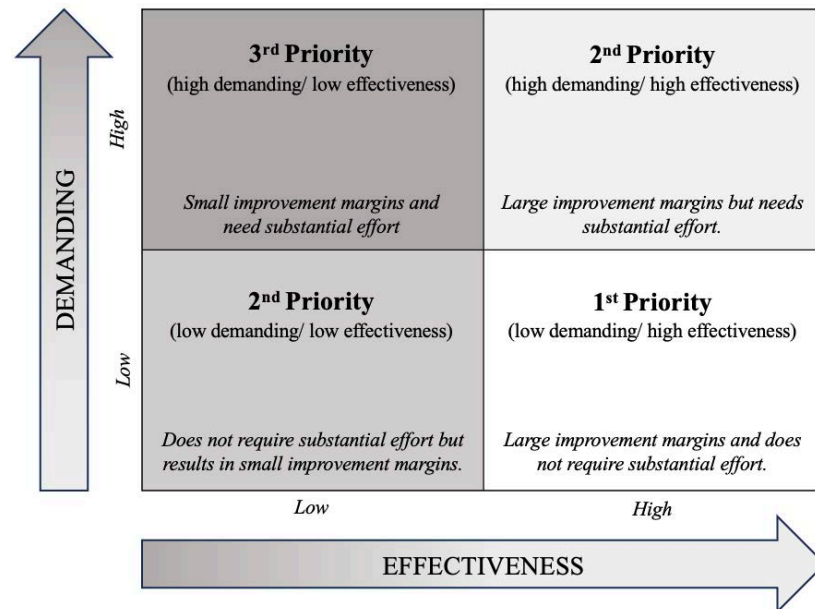


Figure 3-18 Improvement Diagram (Grigoroudis & Siskos, 2002)

Dimensions that fall in the first priority quadrant indicate that improvements in the corresponding dimension should be prioritized because improvements result in large margins and require minimal effort. Dimensions that fall in the second priority quadrants either require minimal effort but result in small improvement margins or result in large improvement margins but need substantial effort. Dimensions that fall in the third priority quadrant represent the dimensions that result in small improvement margins but need substantial effort.

Using MUSA, the researcher developed action diagrams by combining weights and average satisfaction indices, as well as an improvement diagram using average improvement and demanding indices. Three indices defined by Grigoroudis and Siskos (2002) are satisfaction, demanding, and improvement indices. Satisfaction indices are average indices that represent the level of employee global or criteria satisfaction and range between 0–1. Satisfaction indices are considered the average performance indicators (globally or per criteria). Demanding indices are normalized in the interval $[-1, 1]$ and calculated based on the set of estimated added value curves. Demanding indices show employees' demanding level (globally and per criteria) and are considered an indicator of

the extent of the organization's improvement efforts. Improvement indices are the average improvement indices normalized in the interval [0, 1] and show the improvement margins on a specific dimension. Improvement margins are based on the importance of the satisfaction dimensions and the contribution to dissatisfaction.

Grijalva (2017) created an Excel program so that researchers can conveniently insert the results of satisfaction dimensions and global satisfaction dimension for MUSA. A screenshot of the MUSA program in Excel created by Grijalva is presented in Figure 3-18.

Overall Satisfaction Questions					Modified SERVPERF questions						Dependent V.	
Response	Work satisfaction	Problem resolution	Recommendation	Change mgt	Tangibles	Reliability	Responsiveness	Assurance	Empathy	Change	Analysed variable (Change Mgt)	Analysed variable (Change Mgt)
1	5	5	5	5	7	5	5	5	5	5	3	5
2	6	5	6	6	6	6	5	6	6	6	4	6
3	5	5	6	5	6	5	6	6	6	6	3	5
4	6	6	6	6	6	6	6	6	6	6	4	6
5	6	6	6	6	6	6	6	6	6	6	4	6
6	6	5	5	5	6	5	6	6	6	6	3	5
7	7	5	6	6	5	5	6	7	7	7	5	6
8	7	5	5	5	5	5	6	6	6	6	3	5
9	6	6	6	6	5	6	6	6	6	6	4	6
10												
11												
12												
13												
14												
15												
16												
17												

Please update this:
 Scale Points: 7
 Number of Data Points: 9
 Number of Dimensions: 6

Constraint	Cell Reference	Value	Operator	Cell Reference
Constraint 1	\$F\$4:\$F\$5	=		0
Constraint 2	100	=		100
Constraint 3	100	=		100

Decision variables highlighted in yellow
 Paste your decision variable in the orange area
 Paste your 6 dimensions in the green area

Figure 3-19 Screenshot of MUSA in Excel Program Created by Grijalva (2017)

Cronbach's alpha was calculated to test the reliability of the SERVPERF survey. Most studies employ Cronbach's alpha to measure the internal consistency of survey dimensions when testing multiple Likert questions (Asubonteng et al., 1996; Cronin & Taylor, 1992). The optimal value of alpha should be within a range of 0.7 and 0.9. If the alpha value falls lower than 0.7, this means that there are an insufficient number of questions or a lack of heterogeneity of the questions (Tavakol & Dennick, 2011). Alpha values higher than 0.9 suggest that some of the questions are redundant (Tavakol & Dennick, 2011). No validity test was performed on SERVPERF since it was already validated by researchers.

The research team evaluated the average fitting index (AFI) for the customer satisfaction data. The stability of the post-optimality analysis results were used to assess the reliability of the MUSA analysis (Grigoroudis & Siskos, 2002). AFI is assessed based on the optimum error level (F^*) and number of customers (M). AFI is normalized in the interval [0,1] where a 1 would mean that it has zero errors.

$$AFI = 1 - \frac{F^*}{100 \cdot M} \quad (\text{eq.5})$$

3.5 Summary of Research Methodology

The study took place in the registration department of Organization O, a United States-based governmental service organization between 2018 and 2020. The research involved ten people from the registration department; two managers and eight employees.

Research question one asked, “*How do perceptions affect employee and manager improvement behavior?*”. The researcher investigated research question one through a qualitative approach using semi-structured interviews, field notes, and documents. Data was collected before training and twenty months after training. The researcher identified current improvement behaviors and mindset, along with the underlying perceptions. The negative perceptions of current improvement behavior/mindset, if not double loop, were used to facilitate cognitive conflict in training. Perceptions driving the rejection of engaging in double loop behavior/ mindset were used to determine factors in the work environment to consider, which would increase the likelihood of validation and transfer of the new concept in training. Negative perceptions of current double loop behavior/mindset were used to guide which aspects of the work environment to prioritize to maintain double loop behavior.

Research question two asked, “*How is change in employee and manager improvement behaviors represented in satisfaction?*”. The researcher investigated research question two through a qualitative approach through semi-structured interviews. The researcher coded satisfaction from the perceptions of dominant behavior identified in research question one, in the qualitative analysis. The coded satisfaction was categorized based on the type of perception towards behavior. The change of satisfaction and dissatisfaction was analyzed with the change in behavior from before and twenty months after training.

For supplemental analysis, the modified SERVPERF survey was distributed before training, eight months after training, and twenty months after training. The areas of the work environment to prioritize were identified through MUSA, in a quantitative analysis.

4 Results

This chapter summarizes the results of each research question separately. The last section of the chapter will present results from the supplemental analysis and a summary of the results from this research.

4.1 Results for RQ1

Research Question One (RQ1) is, “*How do perceptions affect employee and manager improvement behavior?*” This question was raised to help identify effective training guidance when using the conceptual change method to teach lean concepts. To answer this question, the research team collected qualitative data from interviews and then coded the data to determine employee and manager improvement behaviors, mindset, perceptions of improvement behavior, and perceptions of improvement mindset.

Improvement behaviors are based on past behaviors performed by the employee/manager. Improvement mindset is participants’ knowledge of the system, and ability to assess system health/effectiveness given desired outcomes. In addition, the researcher identified the main reasons employees/managers chose to perform primary behaviors or to create the improvement mindset. These “main reasons” are called “perceptions of behavior” in this dissertation. The perceptions are categorized based on the theory of planned behavior: attitude toward behavior, subjective norm, and perceived behavioral control. Dominant perceptions are the perceptions that have the greatest frequency of occurrence. RQ1 results are divided into two sections: 1) improvement behavior before and twenty months after training and 2) improvement mindset before and twenty months after training. Each section is also divided into results for employees and results for managers.

4.1.1 RQ1 - Improvement Behavior

4.1.1.1 *Employee Improvement Behavior*

Before training, employees mostly engaged in single loop conforming behaviors as determined by 68 occurrences. After training, employees engaged in double loop

enhancing behaviors, as measured by 70 occurrences. The frequency of occurrences for zero loop, single loop, and double loop behaviors are summarized in Table 4-1.

Table 4-1 Employee Zero Loop and Double Loop Improvement Behaviors - Before and Twenty Months After Training

Employees	Zero Loop		Single Loop Conforming		Single Loop Quick Fixing		Single Loop Expediting		Double Loop Enhancing		Double Loop Initiating	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
E1			5	25	2	6	4	5	1	31		5
E2			7	4	1	5		1	3	2		
E3	1		15	7	1	3	2		1	2		
E4			10	8	5	5	6	6	4	14		11
E5			6	5	6	7			1	2		
E6			6	6	4		3	1	3	4	1	3
E7	1		10	4	5	7	8	4	3	7	4	10
E8	2		9	1	15	17	6	2	4	8	1	
Total	4		68	60	39	50	29	19	20	70	6	29

Figure 4-1 displays perceptions of employee improvement behaviors before training. The perceptions driving the dominant improvement behavior in the employee group are placed on the left side of the figure. Since employee improvement behavior before training was primarily single loop conforming behavior (based on no defect present), the next level of learning without a defect present is double loop enhancing. The right half of the figure identifies employee perceptions of barriers to double loop enhancing behaviors.

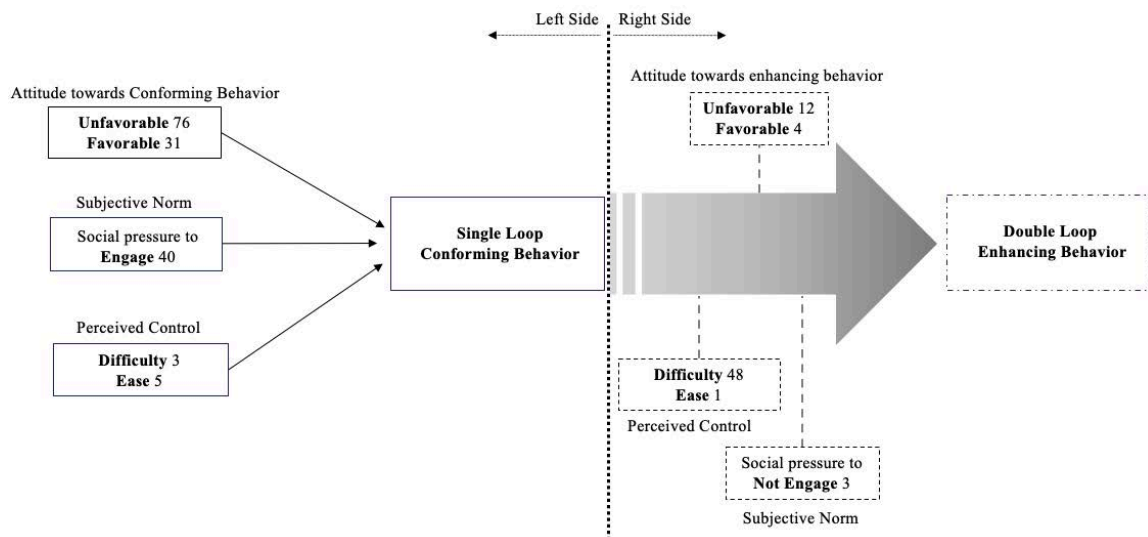


Figure 4-1 Employees' Dominant Improvement Behavior and Perceptions Before Training

Employees identified 76 occurrences of perceived unfavorable outcomes from performing conforming behavior. One of the examples of single loop conforming behavior

was to “*try not to make any mistakes*”. An example of a perceived unfavorable consequence from avoiding mistakes was, “*Sometimes if I forget to do something, I have one co worker who is kind of snotty about it*”. The employees mentioned 40 occurrences of perceived social pressure to perform single loop conforming behavior. One example of perceived social pressure to perform single loop conforming behavior which came from the manager was “*So she doesn't want to have to think about anything other than catching up.*”

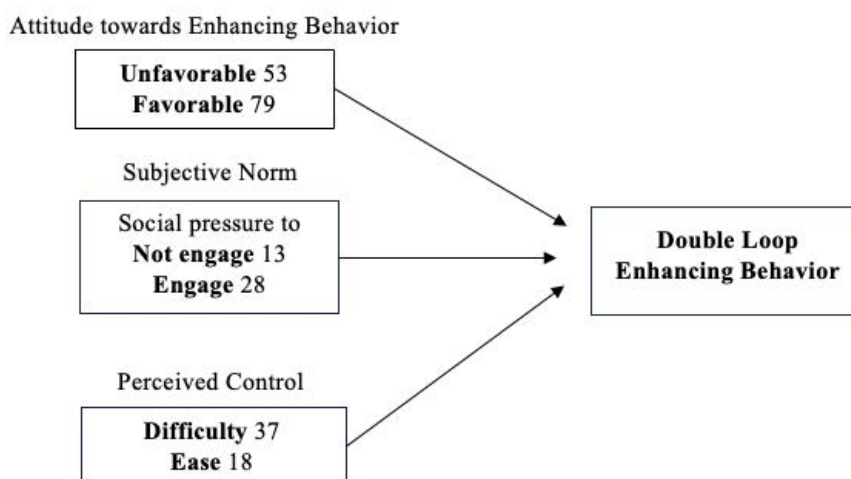


Figure 4-2 Employees' Perceptions and Dominant Improvement Behavior Twenty Months After Training

Figure 4-2 displays perceptions of double loop enhancing behavior of the employee group twenty months after training. The main perceptions were related to attitudes toward behavior with 132 occurrences. Employees had a favorable attitude toward performing double loop behavior based on 79 occurrences. Employees perceived a social pressure to engage in enhancing behaviors as measured from 28 occurrences. Employees perceived that performing enhancing behaviors was more difficult as based on 37 occurrences.

4.1.1.1.1 *Main Perceptions of Employee Improvement Behavior*

Before training, the dominant perception from employees was that single loop conforming behaviors were perceived as unfavorable. This perception was seen in 76 occurrences. Employees complained about long processing times (14 occurrences) and excessive workload (9 occurrences).

The perception with the second greatest number of occurrences was social pressure to engage in single loop conforming behaviors, with 40 occurrences. Employees perceived how the department does things (23 occurrences) and what the employees believed was expected in their roles (six occurrences). Employees had the fewest frequency of occurrences of perceived control in performing single loop conforming behavior. Any perceived difficulty from the employee group came from customers (two occurrences) and not having enough people (one occurrence). Table 4-2 provides a breakdown of the main perceptions of employee behaviors before training.

Table 4-2 Perceptions Driving Employees' Conforming Behavior Before Training

Attitude towards Conforming Behavior		Subjective Norms		Perceived Control	
Perceived unfavorable consequences (76)	Sample Pieces of Evidence	Sources of perceived social pressure to engage in behavior (40)	Sample Piece of Evidence	Factors causing difficulty in performing behavior (3)	Sample Piece of Evidence
- Long to process (14) - A lot of work (10) - Complicated for customers (8) - Coworker attitudes (7) - Challenging (7) - Manager attitudes (4) 	<u>Long to process:</u> <i>"It takes us so long to process"</i> <i>"It's just that it's so many steps to get one title done"</i>	- Department (23) - Employees (6) - Organization (4) - Manager (3) - Customer (1)	<u>Department:</u> <i>"And everybody else does, like two batches. (laughs) And it's been like that the whole time."</i> <u>Employee:</u> <i>"we're definitely like, there's, there's no way we could go any faster than what we're doing based with just two people. There's just no way"</i>	- Cannot control customers' moods and expectations (2) - Not enough people (1)	<u>Cannot control:</u> <i>"Whether it's on the phone or in person, it is a little difficult to help someone who is not in a very good mood."</i>
Perceived favorable consequences (31)	Sample Piece of Evidence			Factors facilitating ease in performing behavior (5)	Sample Piece of Evidence
- Beneficial outcome (24) - Convenient (7)	<u>Beneficial:</u> <i>"this new phone system, it's great."</i> <i>"So there's credentials, and you know, the guide systems on there. Boater education, everything's on there. and it's great"</i>			Soft and hard skills	<i>"It's not something that I'm unaware of. So I do have those skills to help get me through that."</i>

Table 4-3 Perceptions Driving Employees' Enhancing Behavior Twenty Months After Training

Attitude towards Enhancing Behavior		Subjective Norms		Perceived Control	
Perceived unfavorable consequences (53)	Sample Pieces of Evidence	Sources of perceived social pressure to not engage in behavior (13)	Sample Piece of Evidence	Factors causing difficulty in performing behavior (37)	Sample Piece of Evidence
- Manager rejects ideas (24) - Unpredictable responses from manager (10) - Causes more work (5) - Manager responds negatively (4) 	<u>Manager rejects ideas:</u> <i>"Then I was told Well, it's just you two doing it anyway. So just use your judgment because no one else. we don't want anyone else doing it, but you two."</i>	- Manager discourages certain "bigger" ideas (6) - Employees not in agreement (5) - Department (2)	<u>Manager discourages:</u> <i>"they're willing to pay the 1000, however much it was. I mean, it wasn't cheap. to have them change that configuration for them, but not to help us with entry. I mean, you know."</i>	- Managers not willing to discuss (16) - Need huddle (6) - Requires a fight (6) - No authority (7) - Lack of follow through (2)	<u>Managers not willing:</u> <i>"They didn't like not having control over certain things. And so at first, it was a fight to get them to listen and actually hear, you know, what our reasoning behind certain needs were."</i>
Perceived favorable consequences (79)	Sample Piece of Evidence	Perceived social pressure to engage in behavior (28)	Sample Piece of Evidence	Factors facilitating ease in performing behavior (18)	Sample Piece of Evidence
- Fulfills their needs in performing tasks (23) - Positive response from managers (15) - Urgent matters addressed (8) - Feels safe (7) 	<u>Fulfills their needs:</u> <i>"We revamped it for what we what we need to see."</i>	- Employees (19) - Department (4) - Manager (4) - Director (1)	<u>Employees:</u> <i>"And we we've talked just a few of us little co workers have talked about how they spend money and what on."</i>	- Huddles (12) - Manager more approachable (3) - Soft skills (3)	<u>Huddles:</u> <i>"I think with the huddles, they've helped, you know."</i>

Table 4-3 provides a breakdown of the top perceptions of the dominant employee behavior, double loop enhancing, twenty months after training. Employees mostly perceived double loop enhancing behavior as resulting in favorable outcomes as noted in 79 occurrences. The top perceived favorable consequences from performing double loop behavior mainly come from seeing the benefit of the behavior (23 and 8 occurrences) and receiving positive responses from managers (15 occurrences). After perceiving favorable consequences, employees mostly perceived double loop enhancing behavior as having unfavorable outcomes (53 occurrences). The top perceived unfavorable consequences resulted from manager responses, such as rejecting ideas (24 occurrences), unpredictability (10 occurrences), and negative responses (8 occurrences). Employees perceived more social pressure to engage in double loop behavior (28 occurrences) as compared to social pressure to not engage (13 occurrences). The employees perceived other employees as the main source of social pressure to perform double loop behavior as noted in 19 occurrences.

Employees experienced discouragement from managers as the main source of social pressure to not engage in double loop behaviors with six occurrences. Employees perceived double loop enhancing behavior as more difficult based on 37 occurrences – than double loop behavior (18 occurrences). Employees' main perception of difficulty came from manager unwillingness to discuss the issue based on 16 occurrences. Employees perceived the huddle as facilitating performing enhancing behaviors based on 12 occurrences.

4.1.1.1.2 Main Employee Perceptions in Rejecting Double Loop Behavior

The researcher sought to understand not only why employees chose to perform single loop behaviors but also why employees rejected performing double loop behaviors. The research team found in 48 occurrences that indicated that employees choose not engage in performing enhancing behavior due to the perceived difficulty of performing the behavior. The main cause of the difficulty was the lack of follow through by others based on 12 occurrences. The research team also found 12 occurrences of perceived unfavorable outcomes from performing double loop enhancing behavior by employees. Employees

mainly perceived no benefit from performing double loop behavior. Table 4-4 presents the perceptions employees had for not choosing double loop enhancing behavior over single loop conforming before training.

Table 4-4 Perceptions Preventing Employees' Transition from Conforming to Enhancing Behavior Before Training

Attitude towards Enhancing Behavior		Subjective Norms		Perceived Control	
Perceived unfavorable consequences (12)	Sample Piece of Evidence	Sources of perceived social pressure to not engage in behavior (3)	Sample Piece of Evidence	Factors causing difficulty in performing behavior (48)	Sample Piece of Evidence
- No results (5) - No benefit (4) - Unreliable results (2) - Employees quit (1)	<u>No results:</u> <i>"and even if we did have a good idea, im not exactly sure that it would be, you know, it would be accepted or anything."</i>	- Managers (2) - Employees (1)	<u>Managers:</u> <i>"But I also understand where my managers at and that she is, I feel like she is really burdened with a lot of work. And so she doesn't want to think outside the box. She just wants to get things cranked out right now."</i>	- Lack of follow through by others (12) - Processes must be a certain way (10) - Lack of time (9) - Lack of skill (6) 	<u>Lack of follow through:</u> <i>"We haven't had a lot of change but when we do it's not always been very smooth at least on my section."</i>
Perceived favorable consequences (4)	Sample Piece of Evidence			Factors facilitating ease in performing behavior (1)	Sample Piece of Evidence
- Manager listens (2) - Learn (2)	<u>Manager listens:</u> <i>"I would say that I'm listened to."</i>			Managers giving time to improve (1)	<i>"They've been good about it."</i>

4.1.1.2 Manager Improvement Behavior

Table 4-5 presents occurrences of managers' zero, single and double loop behavior before and twenty months after training for managers. The managers mostly performed single loop expediting behavior before training based on 24 occurrences. Managers mostly performed double loop enhancing behavior twenty months after training based on 73 occurrences.

Table 4-5 Managers' Zero Loop and Double Loop Improvement Behavior - Before and Twenty Months After Training

Manager	Zero Loop		Single Loop Conforming		Single Loop Quick Fixing		Single Loop Expediting		Double Loop Enhancing		Double Loop Initiating	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
M1		1	9	10	14	6	21	14	6	64	6	23
M2	2		6	3	9	6	3	3	1	9	1	11
Total	2	1	15	13	23	12	24	17	7	73	7	34

Figure 4-3 displays the perceptions of the managers' main behavior before training and the perceptions that prevented the managers from performing double loop behavior.

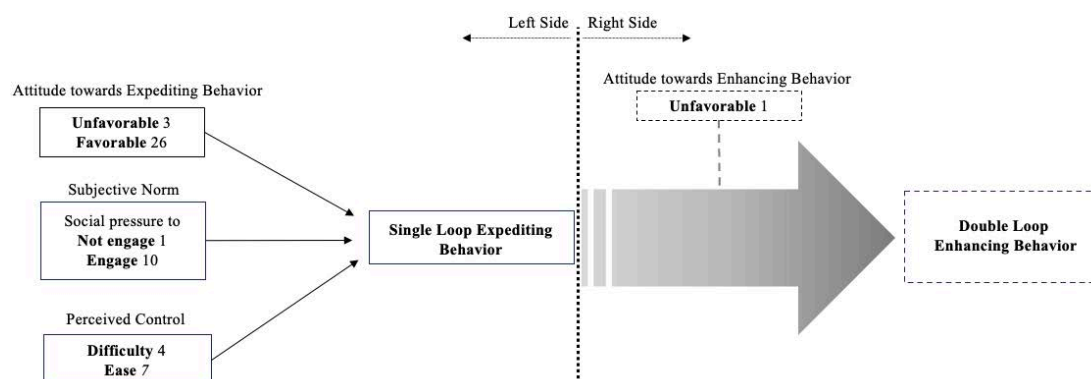


Figure 4-3 Managers' Dominant Improvement Behavior and Perceptions Before Training

The right half of figure 4-3 illustrates the manager reasons for not engaging in double loop enhancing behaviors. Managers perceived that single loop expediting behaviors were perceived to result in favorable outcomes based on 26 occurrences. The research team found ten occurrences of perceived social pressure on managers to engage in single loop expediting behavior. The managers perceived that single loop expediting behavior — seven occurrences. The researcher found that the only reason that the managers rejected performing double loop enhancing over single loop expediting behavior was because the managers believed that the behavior would result in unfavorable outcomes.

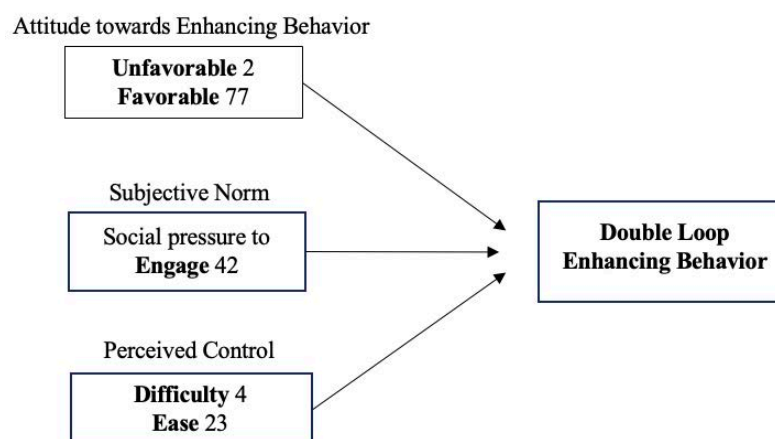


Figure 4-4 Managers' Dominant Improvement Behavior and Perceptions Twenty Months After Training

Managers predominantly displayed double loop enhancing behavior twenty months after training (Figure 4-4). The team identified 77 occurrences that indicated a perception of favorable outcomes by managers when engaging in double loop enhancing behavior.

Managers' perceived social pressure to engage in enhancing behavior based on 42 occurrences. Managers perceived more ease (23 occurrences) than difficulty (four occurrences) when engaging in double loop enhancing behaviors.

4.1.1.2.1 Main Perceptions of Manager Improvement Behavior

Managers perceived that outcomes resulted from performing single loop expediting behaviors [reduced processing times] (11 occurrences). Better customer service (9 occurrences) and manager preference (2 occurrences) were also reasons for engaging in single loop expediting behavior. After perceived favorable outcomes, managers mostly engaged in expediting behaviors resulting from social pressure from the department (6 occurrences), organization (2 occurrences), and customers (2 occurrences). Table 4-6 presents in detail the specific perceptions of managers performing single loop expediting behaviors.

Table 4-6 Perceptions Driving Managers' Expediting Behavior Before Training

Attitude towards Expediting Behavior		Subjective Norms		Perceived Behavioral Control	
Perceived unfavorable consequences (3)	Sample Pieces of Evidence	Sources of perceived social pressure to not engage in behavior (1)	Sample Piece of Evidence	Factors causing difficulty in performing behavior (4)	Sample Piece of Evidence
• Frustrated (2) • Customers have other expectations (1)	<u>Frustrated:</u> <i>"What do I feel about that? That I can't just add a position? Well, the gray hairs I had, I didn't have before this, you know. And so I feel frustrated often. Because it shouldn't be that hard."</i>	• Organization (1)	<i>"I'm the manager, I'm working manager, but technically managers don't."</i>	• Need more authority (4)	<i>"And even though they say, well, there's a hiring freeze, you can't change positions, you can't do this, or you can't do that."</i>
Perceived favorable consequences (23)	Sample Piece of Evidence	Sources of perceived social pressure to engage in behavior (10)	Sample Piece of Evidence	Factors facilitating ease in performing behavior (7)	Sample Piece of Evidence
• Reduced processing times (11) • Better customer service (9) • Preference of doing things (2) • ...	<u>Reduce processing times:</u> <i>"because that's, that's the quickest,"</i> <u>Good customer service:</u> <i>"I just feel it's good customer service"</i>	• Department (6) • Organization (2) • Customers (2)	<u>Department:</u> <i>"and we all kind of kind of look in the mailroom and know how much work we haven't done."</i>	• Experience (3) • The process has little requirements (3) • Has authority (1)	<u>Experience:</u> <i>"all the knowledge I've gained over the years that I've been here.(laughs)"</i>

Table 4-7 Perceptions Driving Managers' Enhancing Behavior Twenty Months After Training

Attitude towards Enhancing Behavior		Subjective Norms		Perceived Behavioral Control	
Perceived unfavorable consequences (2)	Sample Pieces of Evidence	Sources of perceived social pressure to engage in behavior (42)	Sample Piece of Evidence	Factors causing difficulty in performing behavior (4)	Sample Piece of Evidence
- Felt forced at first (1) - Affecting other tasks (1)	<u>Felt forced at first:</u> <i>"it felt a little forced at first,"</i>	- Employees (16) - Department (13) - Director (6) - Organization (5) - Customer (2)	<u>Employees:</u> <i>"And they also, you know, so what do we need? Who needs? Who would? Who hasn't done that? Who needs to learn how to do that? How do we want to approach doing that? You know, "</i>	- Ideas all over the place (1) - Complicated task(1) - Hard sell to agents (1) - A certain employee made it difficult (1)	<u>Ideas all over the place:</u> <i>"I think early on there was that kind of like I said, it was kind of an issue where people were thinking of things that were, you know, just all over the place.."</i>
Perceived favorable consequences (77)	Sample Piece of Evidence			Factors facilitating ease in performing behavior (23)	Sample Piece of Evidence
- Improved processes (37) - Improved group dynamics (9) - Increased knowledge of employees (9) - Able to rely on employees (4) ...	<u>Improved processes:</u> <i>"and making that work well, for us, and effectively."</i>			- Huddles (5) - Time available (5) - Employees are capable in execution (5) ...	<u>Huddles:</u> <i>"We kind of review all those things during our huddle."</i>

Table 4-7 is a summary of the perceptions driving the managers' double loop enhancing behavior twenty months after training. The managers perceived improved processes as the main favorable outcome from performing double loop behavior — 37 occurrences. The managers perceived social pressure to engage in enhancing behavior, mainly from employees, - 16 occurrences. The managers perceived ease in performing enhancing behavior mostly due to the huddles (five occurrences), time available (five occurrences) and employees capability in execution (five occurrences).

4.1.1.2.2 Main Manager Perceptions in Rejecting Double Loop Behavior

Table 4-8 is a summary of managers' attitude towards enhancing behavior. Specifically, the managers perceived performing enhancing behavior would not be favorable because the managers believed the employees would not be willing to email new customers instructions, an effort to make long-lasting system improvements (double loop behavior) — one occurrence.

Table 4-8 Perceptions Preventing Managers' Transition from Expediting to Enhancing Behavior Before Training

Attitude towards Enhancing Behavior	
Perceived unfavorable consequences (1)	Sample Piece of Evidence
Employees not willing to execute (1)	<u>Employees not willing to execute:</u> <i>" and most of my staff will not do this . "</i>

4.1.2 RQ1 - Improvement Mindset

4.1.2.1 *Employee Improvement Mindset*

Table 4-9 presents the frequency of occurrences of zero, single and double loop mindset before and twenty months after training for employees. Employees mostly exhibited a single loop expediting mindset before training based on 16 occurrences. Employees mostly exhibited single loop conforming mindset twenty months after training based on 24 occurrences.

Table 4-9 Employees' Improvement Mindset - Before and Twenty Months After Training

Employees	Zero Loop		Single Loop Conforming		Single Loop Quick Fixing		Single Loop Expediting		Double Loop Enhancing		Double Loop Initiating	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
E1			2	9	1	2			2	5		
E2			1	3			3		1	2		
E3	2	1		1			1					
E4		1		1			2	4	2	5		1
E5			1	1	1		1				1	
E6	5	1		4			3	7	2	1		
E7			1	4		1	5	1	2	2		2
E8			1	1	3	1	1		1	1		
Total	7	3	6	24	5	4	16	12	10	16	1	3

Figure 4-5 displays the perceptions of the employee dominant mindset before training and the perceptions that prevented employees from having a double loop mindset. Employees having a single loop expediting mindset was due to perceived favorable outcomes based on 26 occurrences. The research team found six occurrences of employee perceived social pressure to have a single loop expediting mindset. Employee perceived difficulty in having a single loop expediting mindset was supported with seven occurrences. The research team found that employees had difficulty engaging in double loop enhancing mindset because they believed that having a double loop enhancing mindset would be difficult and result in unfavorable outcomes.

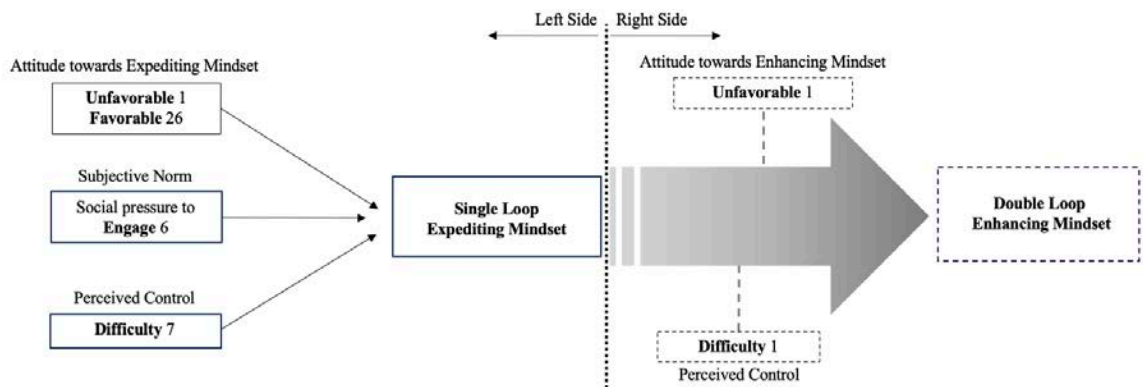


Figure 4-5 Employees' Perceptions and Improvement Mindset Before Training

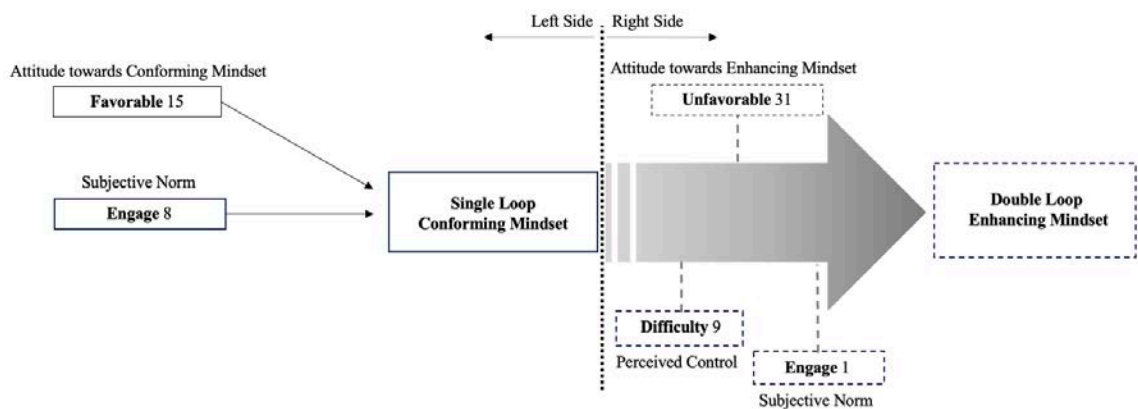


Figure 4-6 Employees' Perceptions and Improvement Mindset Twenty Months After Training

Figure 4-6 presents employees' mindset and the perceptions that drove their mindset twenty months after training. Single loop conforming was the dominant employee improvement mindset twenty months after training. The research team found 15 occurrences that showed a dominant perception by employees that having a single loop conforming mindset would lead to favorable outcomes. The research team found eight occurrences that show employees perceived social pressure to have a single loop conforming mindset. The research team found that employees faced difficulty in having a double loop enhancing mindset as a result of a belief that having a double loop enhancing mindset would result in unfavorable outcomes based on 31 occurrences.

4.1.2.1.1 Main Perceptions of Employee Improvement Mindset

Table 4-10 is a summary of the perceptions of the employee improvement mindset before training. Employees most frequently expressed help with workload as the main favorable outcome from having an expediting mindset based on ten out of 26 occurrences. Employees expressed perceived social pressure from the department to engage in a conforming mindset based on three occurrences. Employees expressed difficulty in relying on agents when having a conforming mindset based on four occurrences.

Table 4-10 Perceptions Driving Employees' Expediting Mindset Before Training

Attitude towards Expediting Mindset		Subjective Norms		Perceived Control	
Perceived favorable consequences (26)	Sample Piece of Evidence	Sources of perceived social pressure to engage in mindset (6)	Sample Piece of Evidence	Factors causing difficulty in having mindset (7)	Sample Piece of Evidence
- Helps with workload (10) - Get better employees (3) - Make it easier (2) - PSR4s can focus on doing their duties (2) ...	<u>Helps with workload:</u> "So we can keep caught up."	- Department (3) - Employee (2) - Organization (1)	<u>Department:</u> "we work really hard. Our agency is just stellar. I mean, we try we care" <u>Employee:</u> "Because the employees. Um a few of the employees who do the most work are constantly going, what does that person do all day? "	- Relying on agents (4) - Lack of resources (2) - Lack of authority (1)	<u>Relying on agents:</u> "And they have so much turnaround on staff that there's, that that's the most, I would say that, you know, when there's turnaround of staff. I mean, we have one person trained and next summer somebody else and so a whole other experience. "

Table 4-11 is a summary of the perceptions with the greatest frequency of occurrences expressed by employees when exhibiting a conforming mindset twenty months after the training. Employees mentioned that 'the current state is better than before' as the most favorable consequence of conforming mindset based on ten occurrences. Employees expressed receiving social pressure from the department and managers to engage in conforming mindset, based on four and three occurrences, respectively.

Table 4-11 Perceptions Driving Employees' Conforming Mindset Twenty Months After Training

Attitude towards Conforming Mindset		Subjective Norm	
Perceived favorable consequences (15)	Sample Piece of Evidence	Sources of perceived social pressure to engage in mindset (8)	Sample Piece of Evidence
- It is better than before (10) ..	<u>It is better than before:</u> "It'll help but I mean, it won't solve all."	- Department (4) - Manager (3) - Employees (1)	<u>Department:</u> "Because we are all separate when it comes to striving to do better,"

4.1.2.1.2 Main Employee Perceptions in Rejecting Double Loop Mindset

Table 4-12 is a summary of the perceptions that employees expressed when not preferring double loop enhancing over single loop expediting before training. Employees mentioned

that no other solution was possible (one occurrence), and the employees lacked trust in the process through which the solution would be executed (one occurrence) as reasons for not engaging in a double loop enhancing mindset.

Table 4-12 Employees' Perceptions Rejecting Double Loop Enhancing Mindset Before Training

Attitude towards Enhancing Mindset		Perceived Behavioral Control	
Perceived unfavorable consequences (1)	Sample Piece of Evidence	Factors causing difficulty in having mindset (1)	Sample Piece of Evidence
No other solution possible (1)	"So yeah, hire more people. That's the bottom line."	Lack of trust in execution (1)	"So I mean, there's a definite training issue, but I don't know how successful training would be."

Table 4-13 is a summary of the perceptions that employees expressed when not preferring having double loop enhancing over single loop conforming mindset twenty months after training. Employees expressed that the manager devalues what people do (seven occurrences) and manager negatively responds (six occurrences) as the most frequently mentioned unfavorable consequences from engaging in an enhancing mindset. Employees believed that the difficulty in engaging in an enhancing mindset was mostly due to limited resources based on four occurrences. Employees mentioned social pressure from a high-performing employee to engage in double loop enhancing mindset based on one occurrence.

Table 4-13 Perceptions Preventing Employees' Transition from Conforming to Enhancing Mindset Twenty Months After Training

Attitude towards Enhancing Mindset		Subjective Norm		Perceived Control	
Perceived unfavorable consequences (31)	Sample Pieces of Evidence	Sources of perceived social pressure to engage in mindset (1)	Sample Piece of Evidence	Factors causing difficulty in having mindset (9)	Sample Piece of Evidence
- Manager devalues what people do (7) - Manager responds in negative way (6) - Adds more work (4) - We're comfortable with the tasks now (4) ...	<u>Manager devalues what people do:</u> "And it's the same issue as it was before, by her leaving out certain people it devalues what people do, I think."	High performing employee (1)	"he's like how come nobody else can use it?"	- Limited resources (4) - Manager not open to helping (2) ...	<u>Limited resources:</u> "until we have a ton more money probably to throw at programming."

4.1.2.2 Manager Improvement Mindset

Table 4-14 displays the zero loop, single loop and double loop mindset before and twenty months after training for managers. Managers mostly exhibited single loop

expediting mindset before training based on six occurrences. Managers mostly exhibited single loop conforming mindset before training based on four occurrences.

Table 4-14 Managers' Improvement Mindset - Before and Twenty Months After Training

Manager	Zero Loop		Single Loop Conforming		Single Loop Quick Fixing		Single Loop Expediting		Double Loop Enhancing		Double Loop Initiating	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
M1		1	2			1	2		2	1		1
M2	1			4	2	1	4	1	2	1		1
Total	1	1	2	4	2	2	6	1	4	2	0	2

Figure 4-7 displays the perceptions of the manager dominant mindset before training and the perceptions that prevented managers from having a double loop mindset. The research team found in 11 occurrences that the managers perceived having an expediting mindset would result in favorable outcomes. Managers perceived difficulty engaging in an expediting mindset based on two occurrences. Managers perceived engaging in an enhancing mindset would result in unfavorable outcomes based on two occurrences.

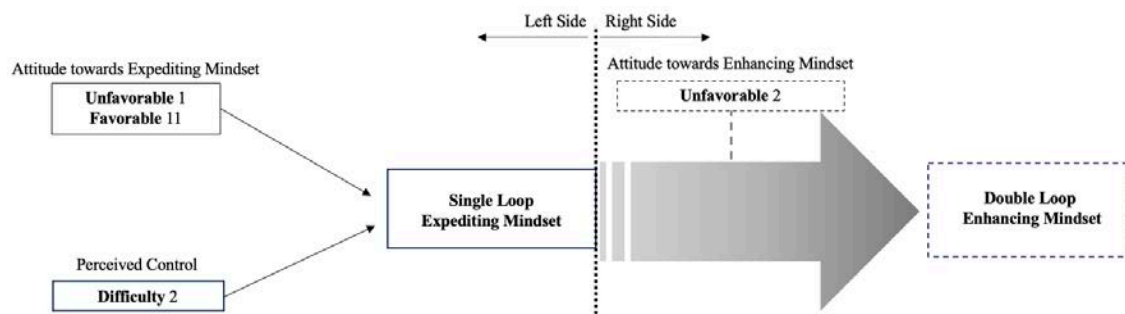


Figure 4-7 Managers' Perceptions and Improvement Mindset Before Training

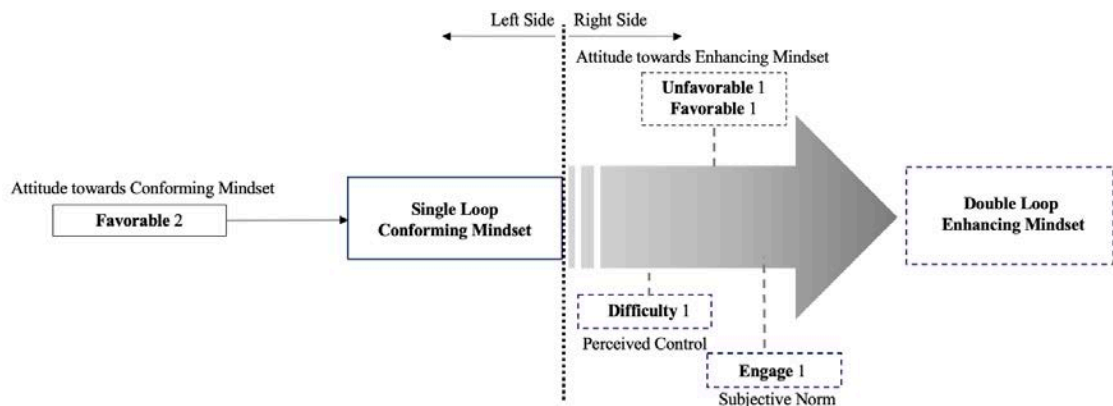


Figure 4-8 Managers' Perceptions and Improvement Mindset Twenty Months After Training

Figure 4-8 presents the perceptions of the manager mindset twenty months after training. Two occurrences indicated that the managers perceived engaging in a conforming mindset would lead to favorable consequences. Managers expressed difficulty in engaging in a double loop mindset based on one occurrence. The managers perceived social pressure to engage in having an enhancing mindset.

4.1.2.2.1 Main Perceptions of Manager Improvement Mindset

Table 4-15 is a summary of the perceptions of managers' expediting mindset. Managers perceived having an expediting mindset would result in favorable outcomes such as easing employees' work (four occurrences), speeding up tasks (three occurrences), and reducing workload (two occurrences). The employees perceived difficulty in having an expediting mindset because of a lack of authority and funding.

Table 4-15 Perceptions Driving Managers' Expediting Mindset Before Training

Attitude towards Expediting Mindset		Perceived Control	
Perceived favorable consequences (12)	Sample Pieces of Evidence	Factors causing difficulty in having mindset (2)	Sample Piece of Evidence
- Eases employees' work (4) - Speeds up task (3) - Reduces workload (2) 	<u>Eases employees' work:</u> <i>"help them do their jobs better. (laughs) And quicker and easier, (laughs)."</i>	- Lack of authority (1) - Lack funding (1)	<i>"if I'm gonna have all that money and all that power, come on."</i>

Table 4-16 lists presents the managers' perceived favorable outcomes from having a conforming mindset. The perceived favorable outcomes are that the problem is not frequent and everything is pretty balanced now, both with one occurrence.

Table 4-16 Perceptions Driving Managers' Conforming Mindset Twenty Months After Training

Attitude towards Conforming Mindset	
Perceived favorable consequences (2)	Sample Piece of Evidence
- Problem not frequent (1) - Everything is <u>pretty balanced</u> (1)	<u>Problem not frequent:</u> <i>"Um, but not, I mean, that's few and far between. "</i>

4.1.2.2.2 Main Manager Perceptions in Rejecting Double Loop Mindset

Table 4-17 presents perceptions expressed by managers preventing engaging in double loop enhancing mindset. The managers perceived unfavorable outcomes would result from engaging in a double loop enhancing mindset based on two occurrences.

Table 4-17 Perceptions Preventing Managers' Transition from Expediting to Enhancing Mindset Before Training

Attitude towards Enhancing Mindset	
Perceived unfavorable consequences (2)	Sample Piece of Evidence
Doesn't solve all (2)	<u>Doesn't solve all:</u> <i>"it won't solve all. "</i>

Table 4-18 Perceptions Preventing Managers' Transition from Conforming to Enhancing Mindset Twenty Months After Training

Attitude towards Enhancing Mindset		Subjective Norm		Perceived Control	
Perceived unfavorable consequences (1)	Sample Pieces of Evidence	Sources of perceived social pressure to engage in mindset (1)	Sample Piece of Evidence	Factors causing difficulty in having mindset (1)	Sample Piece of Evidence
Unnecessary (1)	<i>"Because the PSR fours answer the phones all day. So to me, that is their incentive to make improvements or help suggest improvements."</i>	Employees (1)	<i>"They really want things to self populate."</i>	Limited funds (1)	<i>"until we have a ton more money probably to throw at programming."</i>
Perceived favorable consequences (1)	Sample Pieces of Evidence				
Customers will need less hand holding (1)	<i>"if we can improve the online for the customer, then the customer is going to call this because they're going to need less hand holding to get through the process."</i>				

Table 4-18 is a summary of perceptions, of the manager group, toward having double loop enhancing mindset twenty months after training. The managers perceived "the solutions are unnecessary" as an unfavorable outcome — one occurrence. The managers perceived "customers will need less hand holding" as a favorable outcome — one occurrence. The managers perceived "limited funds" as a root cause for perceived difficulty around enhancing mindset — one occurrence.

4.1.3 RQ1 – Supplemental Results

The current training literature lacks studies including tangible measures like the number of ideas generated, implemented, and brought to fruition (Tan et al., 2023). This section

presents tangible results from the lean implementation. The research team collected the number of ideas suggested and implemented in the huddles through huddle forms and reports. The data can be used to highlight trends related to discussed items in the huddle across the two-year period following training (Figure 4-9). The information in the huddle forms and reports was categorized into three main categories: suggested ideas, implemented ideas, and announcements. Implemented ideas included ideas that were in-progress or already completed. The number of applications processed is also included in Figure 4-9, in line form, to provide context to the number of items discussed in the huddles each month. The registration department experienced high demand twice a year. Boating season was in the summer, so the department received high volumes of registrations in summer months. The second round of high demand would occur around November due to renewals. There were no huddle reports in October 2018.

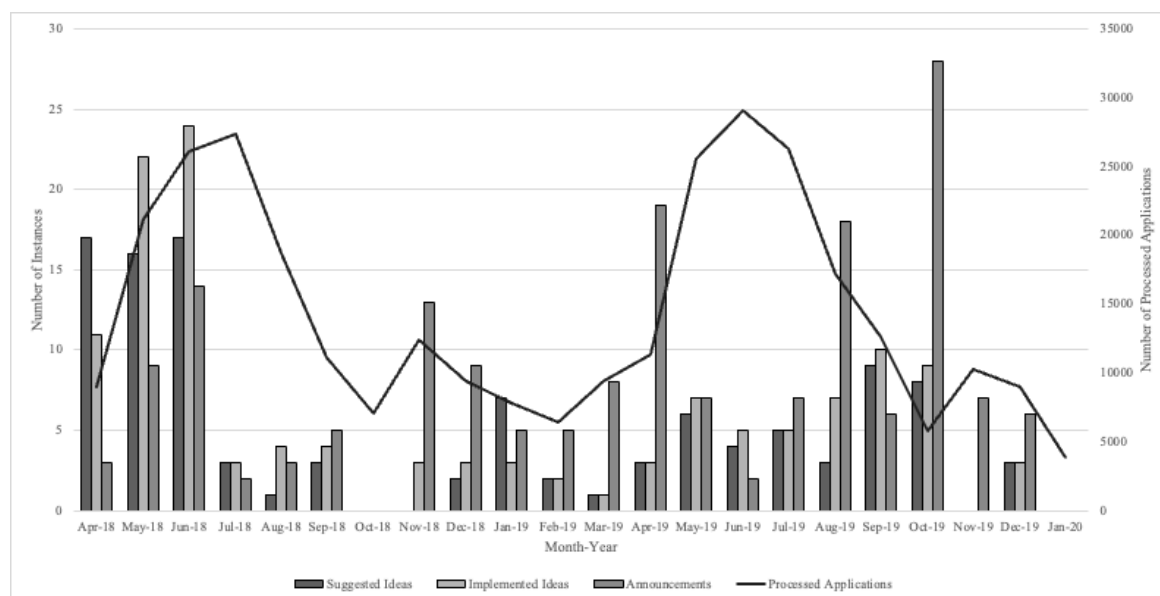


Figure 4-9 Suggested Ideas, Implemented Ideas and Announcements in Huddles Compared to the Number of Processed Applications

To analyze how the processes improved after the training, time studies were conducted before and after the training, as seen in Figure 4-10. Online completion decreased by 25%, reducing the processing of online applications by 20%. Data entry and completion decreased by 26%, reducing processing times of both mail and agent applications by 33%.

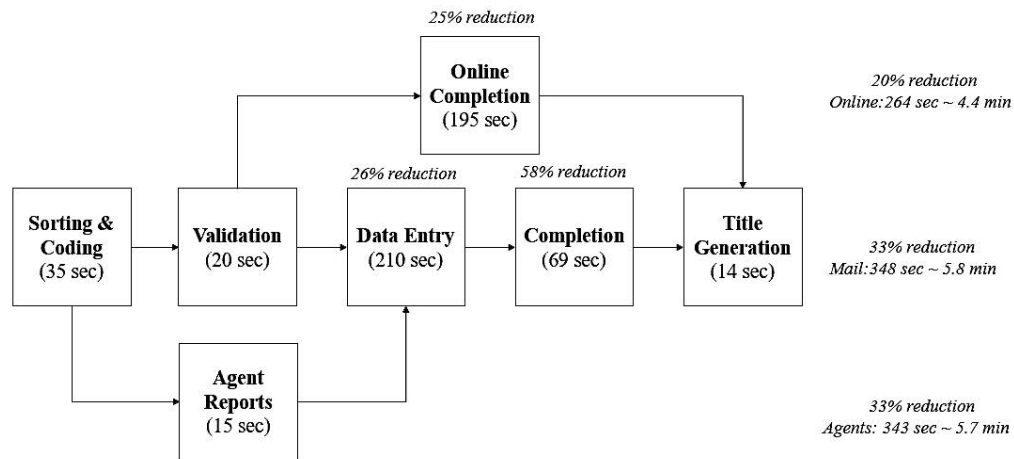


Figure 4-10 Improved Processing Lead Time of the Applications Online, Mail and Agents

4.1.4 RQ1 - Results Summary

Research question one asked, “*How do perceptions affect employee and manager improvement behavior?*”. The researcher used Mazur’s et al. (2012) quality improvement behavior and Argyris & Schon’s (1974) Theory of Action to categorize improvement behavior and mindset in answering research question one. The researcher used the theory of planned behavior to identify the perceptions behind the employee and manager dominant improvement behaviors and mindset. The research team also identified the employees’ and managers’ perceptions driving the rejection of double loop behavior and mindset. The research team then analyzed improvement behaviors and mindsets to guide the conceptual change based training.

Employees predominantly exhibited single loop conforming behavior before training. Employees perceived performing conforming behavior as resulting in beneficial outcomes based on 31 occurrences. Employees also perceived unfavorable outcomes, based on 76 occurrences, mainly focused on behaviors that cause long processing times. Employees perceived social pressure from the department to engage in conforming behavior based on 40 occurrences. However, employees rejected performing double loop enhancing behavior because of employees believing that it was difficult to engage in enhancing behaviors (48 occurrences) as a result of the lack of follow through by others.

Employees also perceived unfavorable outcomes when performing double loop behavior (12 occurrences).

Employees predominantly mentioned double loop enhancing behavior twenty months after training. Employees' perceived performing enhancing behavior would result in favorable outcomes based on 79 occurrences, primarily because outcomes fulfill employee needs. However, employees also perceived performing enhancing behavior would result in unfavorable outcomes based on 53 occurrences. Employee perceived social pressure from other employees to not engage was based on 28 occurrences. Employees perceived performing enhancing behavior as difficult, mainly due to managers' unwillingness to discuss based on 37 occurrences.

Managers predominantly expressed engaging in single loop expediting behavior before training. Managers perceived performing expediting behavior results in favorable outcomes based on 23 occurrences, primarily resulting from reduced processing times. Managers also perceived social pressure from the department to engage in expediting behavior based on ten occurrences. Managers primarily exhibited double loop enhancing behavior twenty months after the training. Managers perceived enhancing behavior would result in favorable outcomes mainly from improved processes based on 77 occurrences. Managers perceived social pressure from other employees to engage in enhancing behavior based on 42 occurrences. Managers perceived ease in performing enhancing behavior resulting from huddles 23 occurrences.

Both employees and managers mainly exhibited expediting mindsets prior to the training. Employees and managers perceived that an expediting mindset would result in favorable outcomes, with 11 and 26 occurrences, respectively. Both employees and managers had predominantly conforming mindsets twenty months after training, primarily because of perceived favorable outcomes by employees (15 occurrences) and managers (two occurrences).

4.2 Results for RQ2

Research question two asked, *“How is change in employee and manager improvement behaviors represented in satisfaction?”* A qualitative approach using semi-structured interviews and surveys was used to investigate research question two. The researcher coded, based on the satisfaction dimensions defined by the modified SERVPERF survey, the perceptions of the dominant behavior identified in research question one. The qualitative analysis investigated the change in employee satisfaction representing employee perceptions towards performing the single loop behaviors before and double loop behaviors twenty months after training.

Employees predominantly expressed performing single loop conforming behavior before training and double loop enhancing behavior twenty months after training. Management predominantly expressed performing single loop expediting behavior before and double loop enhancing behavior twenty months after training. The perceptions from driving employee and manager behaviors most frequently expressed were categorized based on the satisfaction definitions from the modified SERVPERF survey.

4.2.1 RQ2 - Satisfaction Results from Perceptions

Table 4-19 presents employee satisfaction representing perceptions of favorable and unfavorable outcomes from engaging in conforming behavior before training and enhancing behavior twenty months after training. Before training, employees expressed dissatisfaction mostly with change management based on a subtotal of 12 coded responses. Employees expressed an increase in satisfaction with change management twenty months after training, evident from the increase from two to eight occurrences of favorable outcomes. The increase in satisfaction was mainly with the department’s promotion of collaboration based on six coded responses. Twenty months after training, employees expressed an increased dissatisfaction with reliability, specifically with the administrator’s sincere interest in problem resolution based on 17 coded responses.

Table 4-19 Employee Satisfaction Representing Attitude Towards Improvement Behavior

		Attitude Towards Behavior			
		Unfavorable		Favorable	
		Before: SL Conforming	After: DL Enhancing	Before: SL Conforming	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance	3			
	Promises	1	1		
	Service promptness				1
Subtotal		4	1	0	1
Change Management	Collaboration	4	5		6
	Pace	2			
	Communication	4		1	1
	Recognition	2	2	1	1
	Learning Training		1		
Subtotal		12	8	2	8
Empathy	Performance	4	1		
	Needs		4		
Subtotal		4	5	0	0
Tangibles	Technology	4		3	
Subtotal		4	0	3	0
Assurance	Psychological safety	2			
	Courtesy	5	3		
Subtotal		7	3	0	0
Reliability	Problem resolution	3	17		1
	Task Completion				
Subtotal		3	17	0	1
Total		34	34	5	10

Table 4-20 presents manager satisfaction representing perceptions of favorable and unfavorable outcomes from engaging in expediting behavior before training and enhancing behavior twenty months after training. Managers mainly expressed an increase in satisfaction with change management, specifically with the department's promotion of collaboration based on seven coded responses. Managers did not express dissatisfaction based on their perception of the outcomes from performing double loop enhancing behavior.

Table 4-20 Manager Satisfaction Representing Attitude Towards Improvement Behavior

		Attitude Towards Behavior			
		Unfavorable		Favorable	
		Before: SL Expediting	After: DL Enhancing	Before: SL Expediting	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance				
Subtotal		0	0	0	0
Change Management	Collaboration				7
	Pace				
	Learning	1			1
	Communication				1
Subtotal		1	0	0	9
Empathy	Needs				
	Attention				
	Interests				
Subtotal		0	0	0	0
Tangibles	Process-knowledge				
Subtotal		0	0	0	0
Reliability	Problem resolution			1	1
Subtotal		0	0	1	1
Total		1	0	1	10

Table 4-21 presents employee satisfaction representing employee perceived social pressure to engage or not engage with conforming behavior before training and enhancing behavior twenty months after training. Employees expressed dissatisfaction with change management, specifically in collaboration, through employee perceived social pressure to not engage in conforming behavior. Employee dissatisfaction was no longer present with change management twenty months after training but present with assurance and reliability with one coded response each. Twenty months after training, there was no increase in satisfaction based on perceived social pressure to engage.

Table 4-21 Employee Satisfaction Representing Subjective Norm

		Subjective Norm			
		Not Engage		Engage	
		Before: SL Conforming	After: DL Enhancing	Before: SL Conforming	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance	1			
	Promises				
	Service promptness				
	Subtotal	1	0		0
Change Management	Collaboration	4			
	Pace	1			
	Communication	2			
	Recognition			1	
	Learning				
	Training				
	Subtotal	7	0	1	0
Empathy	Performance				
	Needs				
	Subtotal	0	0	0	0
Tangibles	Technology	2			
	Subtotal	2	0	0	0
Assurance	Psychological safety				
	Courtesy		1		
	Subtotal	0	1	0	0
Reliability	Problem resolution		1		
	Task completion				
	Subtotal	0	1	0	0
	Total	10	2	1	0

Table 4-22 presents manager satisfaction representing manager perceived social pressure to engage or not engage with expediting behavior before training and enhancing behavior twenty months after training. Managers did not express dissatisfaction based on perceived social pressure not to engage. Managers expressed an increase in satisfaction with change management, specifically in the department's promotion of collaboration, twenty months after training.

Table 4-22 Manager Satisfaction Representing Subjective Norm

		Subjective Norm			
		Not Engage		Engage	
		Before: SL Expediting	After: DL Enhancing	Before: SL Expediting	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance				
	Subtotal	0	0	0	0
Change Management	Collaboration				3
	Pace				
	Learning				
	Communication				1
	Recognition				
	Subtotal	0	0	0	4
Empathy	Needs				
	Attention				1
	Interests				
	Subtotal	0	0	0	1
Tangibles	Process-knowledge				
	Subtotal	0	0	0	0
Reliability	Problem resolution				
	Subtotal	0	0	0	0
	Total	0	0	0	5

Table 4-23 presents employee satisfaction representing employees' perceived ease and difficulty in performing conforming behavior before training and enhancing behavior twenty months after training. The employees' perceived difficulty translated to an increase in dissatisfaction from before training to twenty months after training, based on 22 coded responses. Dissatisfaction increased mainly in change management (8 total coded responses) and empathy (6 total coded responses). Employee satisfaction, despite not being as high as dissatisfaction, increased mainly with change management based on employees' perceived ease in performing enhancing behavior.

Table 4-23 Employee Satisfaction Representing Perceived Control

		Perceived Control			
		Difficulty		Ease	
		Before: SL Conforming	After: DL Enhancing	Before: SL Conforming	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance		1		
	Promises	2			
	Service promptness		3		1
Subtotal		2	4		1
Change Management	Collaboration		3		2
	Pace	1			
	Communication	2			
	Recognition				
	Learning		5		1
	Training	2			
Subtotal		5	8	0	3
Empathy	Performance				
	Needs		6		
Subtotal		0	6	0	0
Tangibles	Technology	1			
Subtotal		1	0	0	0
Assurance	Psychological safety				
	Courtesy		2		
Subtotal		0	2	0	0
Reliability	Problem resolution		2		
	Task completion				
Subtotal		0	2	0	0
Total		8	22	0	4

Table 4-24 presents manager satisfaction representing managers' perceived ease and difficulty in performing expediting behavior before training and enhancing behavior twenty months after training. Before training, managers perceived difficulty in performing expediting behavior, which translated into dissatisfaction with change management and empathy. However, twenty months after training, managers expressed an increase in satisfaction with change management, mainly with the department's promotion of collaboration, based on perceived ease in performing the double loop enhancing behavior.

Table 4-24 Manager Satisfaction Representing Perceived Control

		Perceived Control			
		Difficulty		Ease	
		Before: SL Expediting	After: DL Enhancing	Before: SL Expediting	After: DL Enhancing
		Dissatisfaction		Satisfaction	
Responsiveness	Assistance				
	Subtotal	0	0	0	0
Change Management	Collaboration				3
	Pace	1			
	Learning	3			
	Communication Recognition				1
	Subtotal	4	0	0	4
Empathy	Needs	1			
	Attention				
	Interests				1
	Subtotal	1	0	0	1
Tangibles	Process-knowledge				
	Subtotal	0	0	0	0
Reliability	Problem resolution			1	1
	Subtotal	0	0	1	1
	Total	5	0	1	6

4.2.2 RQ2 - Results Summary

Research question two asked, "*How is change in employee and manager improvement behaviors represented in satisfaction?*" Manager satisfaction increased mainly with change management regarding the perceived favorable outcomes from performing double loop enhancing behavior. Even though the employees also predominantly mentioned performing double loop enhancing behavior twenty months after the training, there was a high level of dissatisfaction, specifically in reliability, empathy,

and change management. Employee dissatisfaction with reliability, specifically with manager's interest in problem resolution, stemmed mainly from perceived unfavorable outcomes when engaging in enhancing behaviors. From employee perceived difficulty in performing enhancing behavior, employee dissatisfaction increased with change management, specifically in being allowed to learn, and with empathy, specifically in the organization's ability to understand employee's specific needs.

4.3 Supplemental Analysis Results

The Modified SERVPERF survey has four overall satisfaction questions and six sections with more specific questions. The six sections with more specific questions: 1) tangibles, 2) reliability, 3) responsiveness, 4) assurance, 5) empathy, and 6) change management. The aim of research question two is to understand how employee satisfaction can be incorporated to guide the training. SERVPERF results are used to see how employee satisfaction changed at three time periods: before training, eight months after training and twenty months after training. MUSA results helps identify which area of employee satisfaction to prioritize in lean implementation. The following section is a summary of the overall employee and manager satisfaction results.

4.3.1 Overall Satisfaction Results

Figure 4-11 displays the four overall questions categorized by employees and managers at three points in time: before training, eight months after training and twenty months after training. To simplify presentation of the results, inside the graphs results before training will be labelled '2018', results eight months after training will be labelled '2019' for and results twenty months after training will be labelled '2020'.

Managers' satisfaction with all four overall questions increases every year. Employee satisfaction decreased for every question in eight months after training except for the change management question. The only question where both employees and managers experienced increased satisfaction every year was change management (bottom right graph). Individual satisfaction for each SERVPERF question is presented in appendices 8.3 through 8.12.

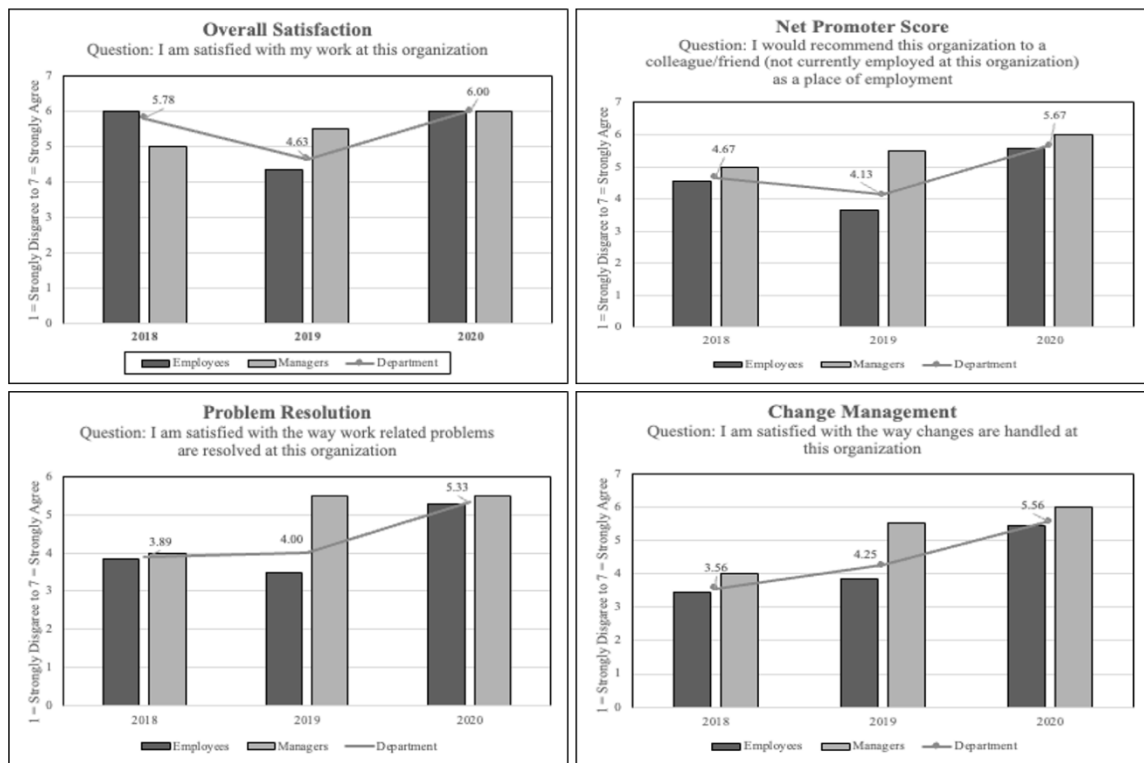


Figure 4-11 Overall Satisfaction Questions Employee vs. Manager

4.3.2 MUSA Results

The MUSA results for each year are examined in an action and relative improvement diagram. In either diagram, when a satisfaction dimension is identified as a priority, the researcher looks at the average of each satisfaction to identify the survey item with the lowest average.

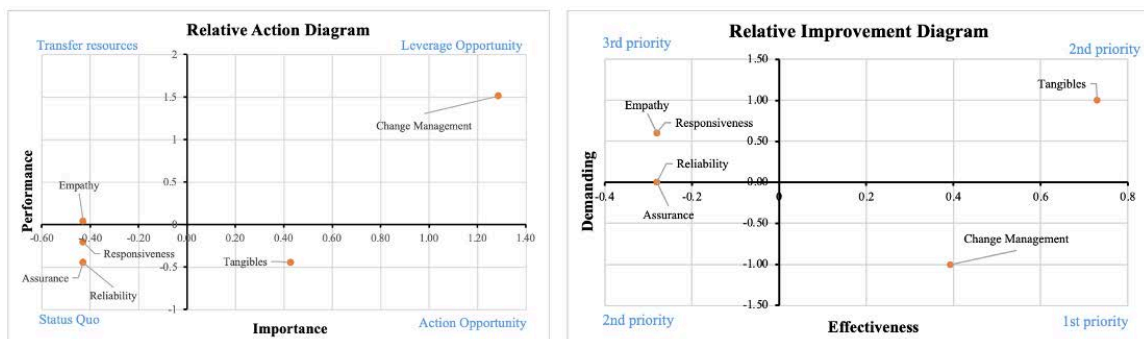


Figure 4-12 Relative Action and Improvement Diagram Before Training (2018)

Figure 4-12 presents the action and improvement diagram produced by MUSA before training. Before training, MUSA indicated tangibles needed immediate attention

(action diagram) and that improvement in the change management dimension would result in large improvement margins and would not require substantial effort (improvement diagram). Table 4-25 presents the average satisfaction with tangibles of the registration department before training. The survey item “*This organization is equipped with up-to-date technological tools*” had the lowest average satisfaction of 4.33.

Table 4-25 Average Satisfaction for Tangibles Questions Before Training (2018)

Tangibles Question	Mean
This organization has modern looking equipment	4.78
Service-related materials (e.g. brochures and handouts) at this organization are visually appealing	5.56
<i>This organization is equipped with up-to-date technological tools</i>	4.33
I feel confident that I can describe the entire process (e.g. application submission to title generation, or other services) at this organization	6.22
Staff at this organization dress neatly	5.22
I feel confident that I can describe the entire process (e.g. application submission to title generation, or other services) at this organization	5.78

Table 4-26 presents the average satisfaction of the registration department with change management before training. The questions “*My organization has effective communication between all staff members*” and “*Management at my organization provides effective training for employees*” had the lowest average satisfaction of 3.78.

Table 4-26 Average Satisfaction for Change Management Questions Before Training (2018)

Change Management Questions	Mean
When a change is needed, managers implement it at a pace that allows employees to easily adjust	4.44
My organization promotes staff collaboration and support	4.56
<i>My organization has effective communication between all staff members</i>	3.78
My organization allows its staff to learn to increase their independence and responsibility	4.22
<i>Management at my organization provides effective training for employees</i>	3.78
Management at my organization values and recognizes my work	4.67

Figure 4-13 presents the action and improvement diagram produced by MUSA eight months after training. MUSA indicates that there were no satisfaction dimensions

located in the action opportunity and first priority quadrant. Since responsiveness, in the action diagram, fell very close to the border between the status quo and action opportunity quadrants, responsiveness would be prioritized.

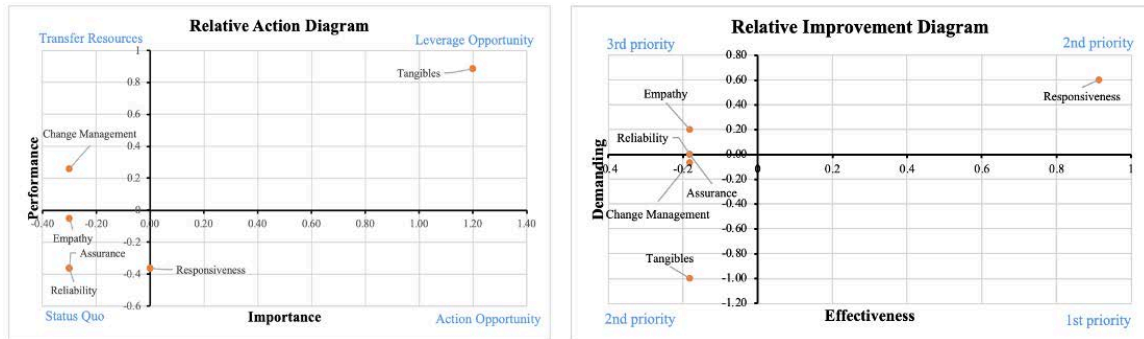


Figure 4-13 Relative Action and Improvement Diagram Eight Months After Training (2019)

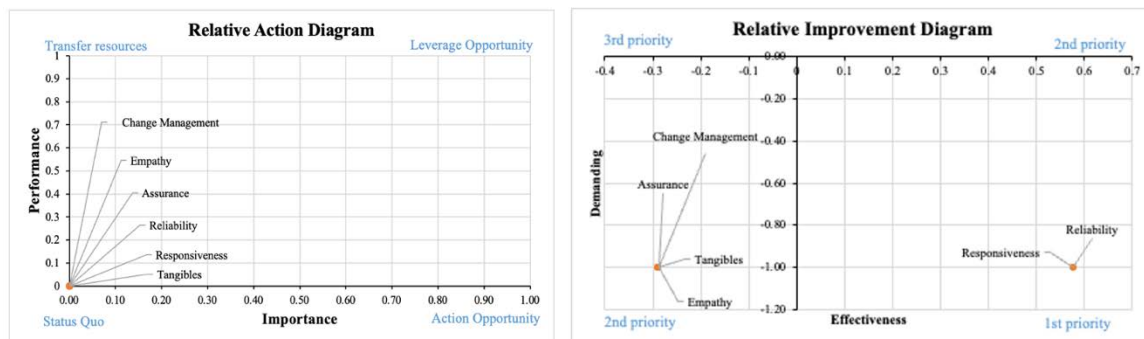


Figure 4-14 Relative Action and Improvement Diagram Twenty Months After Training (2020)

Figure 4-14 presents the action and improvement diagram produced by MUSA twenty months after training. In the action diagram, all satisfaction dimensions were of equal importance and did not need to be prioritized. The relative improvement diagram shows that improvements in responsiveness and reliability will result in large improvement margins and would not require substantial effort.

Table 4-27 presents the average satisfaction of the registration department with responsiveness twenty months after training. The questions “*When needed, staff from other services are rarely too busy to respond to my requests/provide timely feedback*” and “*When supervisors/administrators promise to do something by a certain time, they do it as promised (changes, implementations, improvements)*” had the lowest average satisfaction of 5.22.

Table 4-27 Average Satisfaction for Responsiveness Questions Twenty Months After Training (2020)

Responsiveness Questions	Mean
When needed, staff from other departments/teams provide prompt service to me	5.56
When needed, staff from other services are always willing to help me	5.67
<i>When needed, staff from other services are rarely too busy to respond to my requests/provide timely feedback</i>	5.22
<i>When supervisors/administrators promise to do something by a certain time, they do it as promised (changes, implementations, improvements)</i>	5.22

Table 4-28 presents the average satisfaction of the registration department with responsiveness twenty months after training. The questions “*Staff at upstream or downstream services/procedures tell me exactly when their tasks (that I need for my work) will be completed*” had the lowest average satisfaction of 5.22.

Table 4-28 Average Satisfaction for Reliability Questions Twenty Months After Training (2020)

Reliability Questions	Mean
Supervisors show sincere interest in resolving problems when they (problems) occur	5.44
Staff perform services right the first time	5.67
Staff generally perform error-free procedures (e.g., data entry, validation, reports, etc.)	5.78
Records are accurate and up-to-date	5.56
<i>Staff at upstream or downstream services/procedures tell me exactly when their tasks (that I need for my work) will be completed</i>	4.78

4.3.3 Summary of Supplemental Results

For further analysis, MUSA was utilized to identify which area of the work environment should be prioritized to increase employee satisfaction in the workplace. Before training, MUSA indicated tangibles needed immediate attention and that improvement in the change management dimension would result in large improvement margins and would not require substantial effort. Eight months after training neither the relative action diagram nor the relative improvement diagram identified a satisfaction dimension to prioritize. Twenty months after training, improvements in responsiveness and reliability will result in large improvement margins and would not require substantial effort.

4.4 Summary of Results

Research question one asked, *“How do perceptions affect employee and manager improvement behavior?”* The research team analyzed employee and manager improvement behavior, mindset, and their respective perceptions to answer this question. Employees predominantly mentioned engaging in conforming behavior before training and enhancing behavior twenty months after training. Managers predominantly mentioned engaging in expediting behavior before training and enhancing behavior twenty months after the training. Despite both employees and managers perceiving that performing enhancing behavior would result in favorable outcomes, employees perceived the behavior as difficult and resulting in multiple unfavorable outcomes. In contrast, managers perceived performing enhancing behavior as easy. Employee and manager mindsets were mainly expediting before the training mainly because of the perception that the workload would be alleviated. Twenty months after training, employee and manager mindset were mainly conforming because the employee perceived it was better than before, while the managers perceived that problems do not occur frequently.

Research question two asked, *“How is change in employee and manager improvement behaviors represented in satisfaction?”* To answer this question, satisfaction was coded from perceptions driving improvement behavior. Both managers and employees experienced an increase in satisfaction with change management resulting from the

perceived favorable outcomes in engaging in enhancing behaviors. Manager satisfaction with change management increased on all three perceptions driving enhancing behavior. From employee perceived difficulty in performing enhancing behavior, employee dissatisfaction increased with change management, specifically in being allowed to learn, and with empathy, specifically in the organization's ability to understand employee's specific needs.

From the supplemental results, MUSA suggested that tangibles and change management be an improvement priority before training and responsiveness and reliability twenty months after training. Based on overall satisfaction from modified SERVPERF survey results, employees were dissatisfied in 2019 in every dimension except change management while managers increased in satisfaction every year.

5 Discussion

This chapter discusses the results and how the findings were used to guide the training.

5.1 RQ1 – Interpretation of Results

Research Question One (RQ1) is, “*How do perceptions affect employee and manager improvement behavior?*”. The research team identified the most frequently mentioned improvement behaviors and mindsets before training and twenty months. The research team also identified employee and manager perceptions driving the improvement behaviors and mindset. The identified perceptions of behavior and mindset were used to help guide the conceptual change training. Section 5.1.1. presents how the data from research questions one and two were interpreted and used to guide the training. Section 5.1.2. presents how the data after training were interpreted to guide future changes in the department. Section 5.1.3 presents how the supplemental research with MUSA and modified SERVPERF survey results were analyzed. Section 5.1.4 presents the lessons learned from this research. The summary of this chapter is in the last section.

5.1.1 Before Training

Both managers and employees mostly engaged in a single loop expediting mindset before training. Managers mostly mentioned engaging in single loop expediting behavior while employees mostly mentioned engaging in single loop conforming behavior before training.

Employees and managers need to be dissatisfied with their current improvement behavior before embracing double loop behavior, which is the aim of the “Generate a meaningful conflict” phase in the conceptual change based training. The research team used negative perceptions of the most frequently mentioned improvement behavior of each group to convince the employees and managers that the current behaviors are not optimum.

Figure 5-1 summarizes how the research team used the negative perceptions to encourage cognitive conflict and identify which aspects should be included in concepts in order to be attractive to employees.

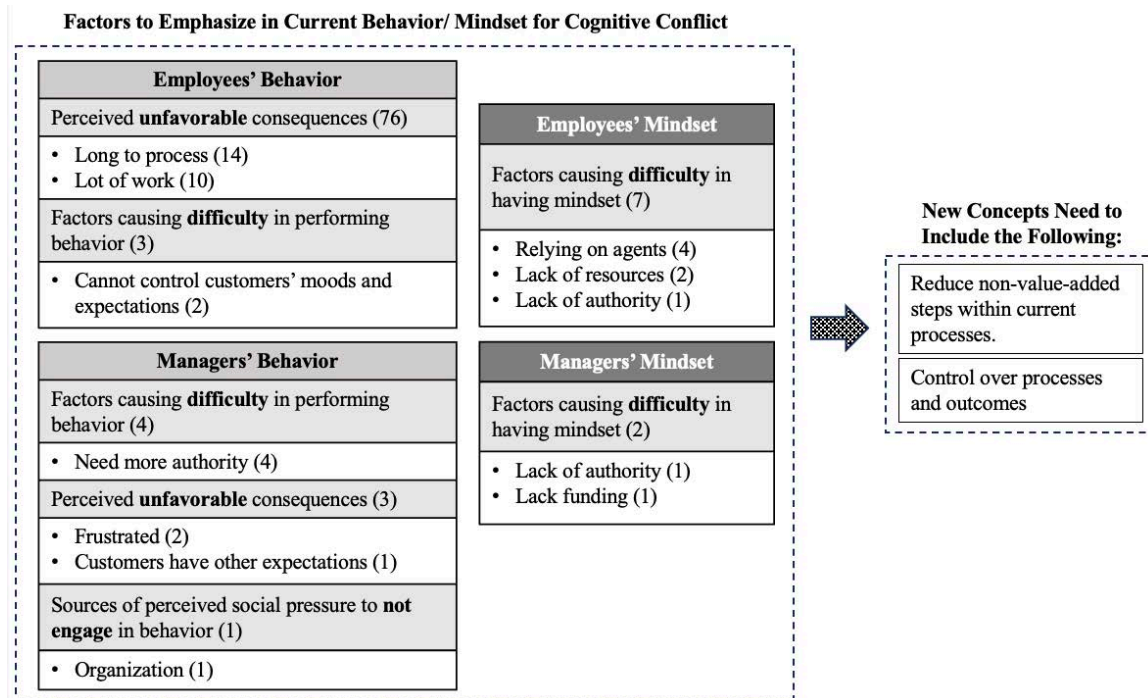


Figure 5-1 Summary of How the Negative Perceptions Were Used to Guide Concepts in Training

The research team concluded that the employees did not like dealing with long processing times and experienced a lot of work when performing conforming behavior. The managers complained of not having enough authority to implement ideas because of the amount of bureaucracy. The researchers concluded that concepts involving reducing non-value-added work and having more control over processes and outcomes should be attractive to employees and managers in training.

Before embracing the new concept in training, employees and managers need to believe that the new concept is intelligible, plausible, and beneficial. Perceptions that employees and managers expressed when not wanting to perform double loop behavior over single loop were used to identify the aspects of the work environment that need to be changed to make the new concept perceived as beneficial. Figure 5-2 summarizes how the research team used the perceptions to guide the introduction and acceptance of the new concept.

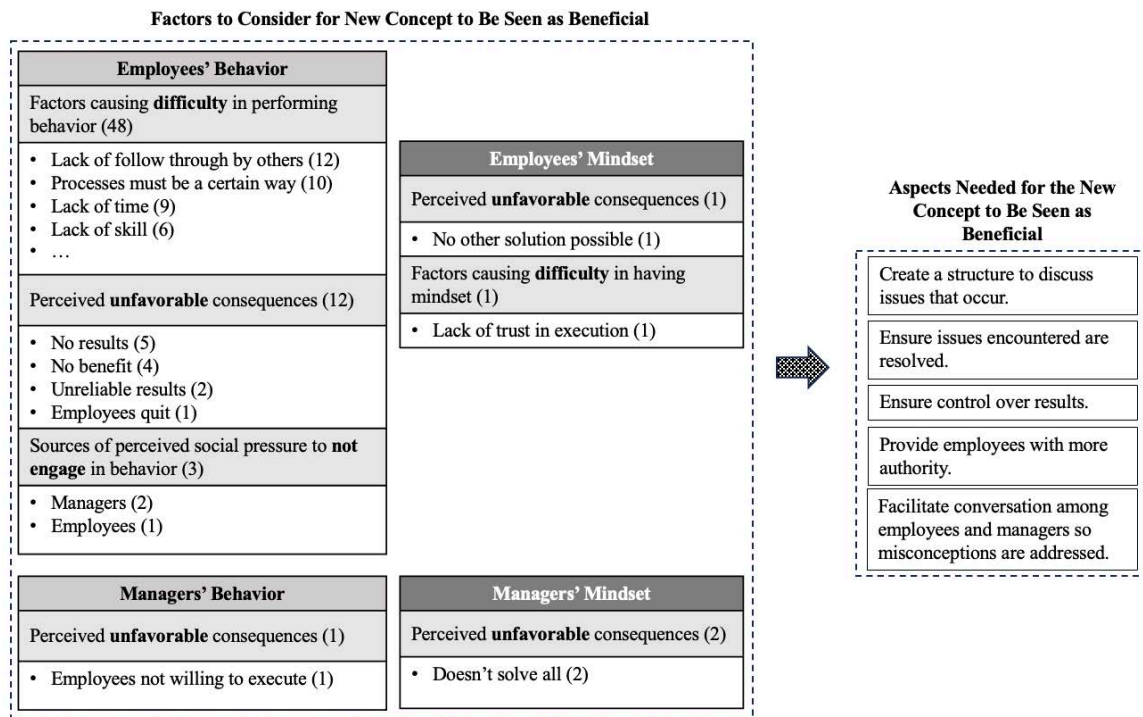


Figure 5-2 Summary of How the Perceptions Driving Rejections of Double Loop Behavior Were Used to Guide the Training

Before training, managers and employees mostly suggested hiring extra data entry staff to reduce backlog. Managers and employees rejected lean alternatives because of perceived unfavorable outcomes, including not solving all problems in the department or would not be better than hiring new people. The employees' largest deterrent in performing double loop behavior was perceived difficulty based on 48 occurrences. To eliminate perceived difficulties, the department needed to create a simple structure so issues could be brought up and resolved as they occurred. However, employees perceived double loop behavior would not be accepted by managers and the managers believed the employees would not do the tasks, stating, "*most of my staff will not do this.*" The research team concluded that the difference in the way managers and employees looked at their respective environments should be addressed in the training to achieve cognitive conflict.

The difference in perception was also reflected in the difference in satisfaction. The researcher found that based on how employees perceived unfavorable outcomes from engaging in single loop conforming behavior, employees were mostly dissatisfied with the lack of courtesy from others in the registration department. Employees also expressed

dissatisfaction with the lack of collaboration and communication, whereas management mainly reflected dissatisfaction with the lack of independence. Both employees and managers were similarly dissatisfied with how change is managed in the organization.

Before achieving cognitive conflict, the employees and managers need to be aware of their own and each other's preconceptions. The trainers first separated the employees and managers into separate rooms and proceeded to ask the employees to list and discuss all cultural issues in the workplace. The employees came to an agreement that the biggest cultural issue was difficulty in having discussions with the managers and group collaboration. The trainers then facilitated a safe environment for the employees and managers to discuss the main cultural issues. Both managers and employees were happy to know that, ultimately, both sides want to work together, but the department currently does not facilitate the collaboration. The group's realization of a need for more collaboration helped them see the benefit of a new concept, the huddle. Anticipating a traditional lecture was insufficient for employees and managers to understand all the benefits of a huddle, so the research team facilitated a Q&A session with a huddle expert and brought the group on a tour to a large hospital that has implemented huddles at all levels and embedded the spirit of continuous improvement into the culture. Afterward, the group collaborated in designing the huddle structure, schedule, and board so that the huddle was uniquely beneficial to the registration department.

Employees and managers also expressed a lack of control in dealing with customers and agents. In the training, the research team taught the concept of 5S and Poka Yoke. The group then discussed how to apply 5S and Poka Yoke and how to implement various penalties for customers' mistakes or incomplete application forms and agents' late submissions. Figure 5-3 provides an example of how the perceptions were used in the training.

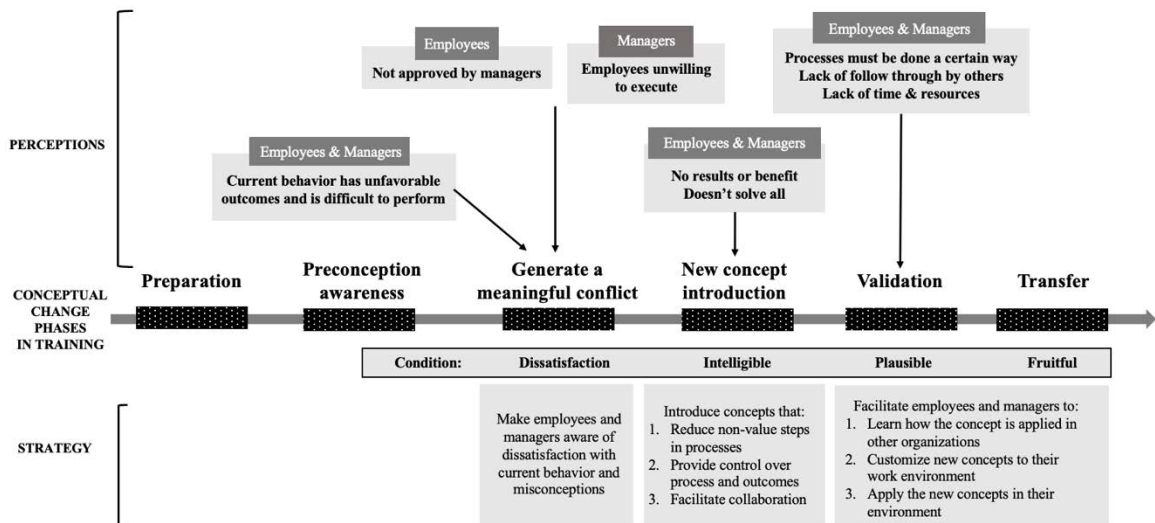


Figure 5-3 Example of How Perceptions Were Used in the Training

5.1.2 After Training

Evident in their behavior twenty months later, the employees and managers mostly mentioned engaging in double loop enhancing behavior with the huddle as the main facilitating factor of their perceived ease in performing the behavior. However, both managers and employees predominantly engaged in a single loop conforming mindset indicating that double loop behavior is not sustainable.

Employees were unwilling to shift from single loop conforming mindset because of the difficulty perceived with engaging in a double loop mindset. Therefore, perceived difficulty should be prioritized in order to maintain employees double loop behavior. Managers were unwilling to shift to engaging more in double loop mindset because they did not perceive the mindset as necessary.

Figure 5-4 summarizes how, in the future, the organization can employees' negative perceptions of double loop behavior. Most of the factors that made up the employees' perceptions were due to the negative responses from the managers, the managers' unwillingness to discuss or understand, and the tendency to take over the huddles. As stated by an employee *"but she'll jump in and, you know, change it to whatever she wants to talk about sometimes,"*.

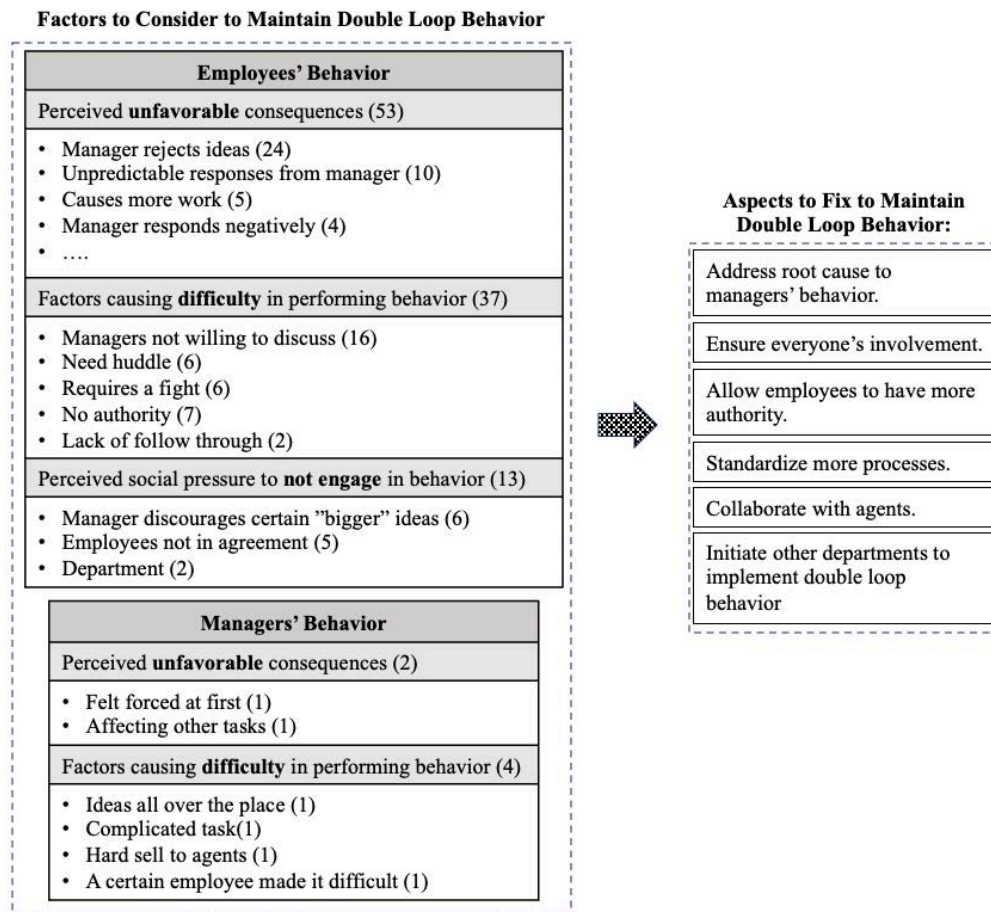


Figure 5-4 Summary of How Negative Perceptions Can Be Used to Identify Aspects to Fix to Maintain Double Loop Behavior

The huddles facilitate the department to solve problems and handle changes. However, the events and patterns of behavior during the beginning of the huddle implementation will form the employees' and managers' perceptions of how problems are solved and changes handled going forward. During the initial period, an employee suggested having headsets to allow the employees to move around while speaking to customers on the phone. The employee even provided cost-effective options so that the headsets were affordable. However, the managers dismissed the headset and did not provide adequate consideration to the idea, but since the employee truly believed the idea was beneficial and did not understand the managers' response, the employee continued to fight for the headsets, which eventually led to arguments in front of all the employees in

the registration department. The managers not understanding the problems experienced by the employees was a continuous pattern expressed by the employees after training.

Another example of the manager not understanding the employees' problems was when an employee brought up a problem with the printers, which caused the employee to manually enter coupons, but the problem was not resolved because the employee was the only one experiencing the problem and the managers did not give authority to solve the problem. The difference between the managers' and employees' patterns of satisfaction every year represented different perspectives of the work environment.

Employees mentioned that announcements became the norm of the huddle and that no "big ideas" can be brought up, which explains the employee's tendency to have a single conforming mindset. An employee stated, "*really what we're all waiting on is for M1 to retire.*" The employees perceived having a single loop conforming mindset would produce favorable consequences since the employees would not have to deal with manager responses to employee suggestions.

However, looking at the managers' perceptions of double loop enhancing behavior, there was a stark difference between perceived barriers and facilitating factors in performing the behavior by the managers and the employees. The managers perceived performing enhancing behavior with ease. In multiple instances, the manager praised the director for facilitating the managers' learning (e.g., conducting organization-wide meetings, closing up for an hour so that staff from the registration department who need to provide customer service can attend without worrying to have to do their job). The director gave authority to the registration department to hang up on angry customers, which was never done before. The director also encourages double loop behavior by being an example, by conducting regular Gemba walks, encouraging other departments to conduct huddles following the registration department, and inspiring other managers to support the employees.

To understand the reasoning behind the managers' conforming mindset, the researcher tried to understand if the manager felt her continuous improvement performance was recognized at a higher level. The manager felt very supported by the director but

mentioned that the current key performance metrics did not value her efforts to continuously improve, stated as follows:

“what's hard about the state is that the pay or the compensation is by step, and they move up a step every year regardless of how you rank them. Which it's kind of like then what's the point? So it's it's kind of like when I worked at Hewlett Packard, you could get a zero to 12% raise based on review. Well, in the state, (if it's not going to affect, then like how?) yeah. So if the person is just doing the basics, they're gonna get a raise, just like your shining star would be getting raise. And it's just so. it's just doesn't seem right. It's one of the things that bothers me about the state and how they do their. “

The managers' lack of incentive to continuously improve, in addition to her perceived favorable outcomes, social pressure to engage, and perceived ease in performing enhancing behavior made the managers complacent. Therefore, to maintain double loop behavior in the registration department, an intervention would need to be done so that the employees and managers address the discrepancy in the way ideas are discussed and accepted. The employees should be given more authority so that more ideas can be implemented since employees are the ones who see more processes firsthand.

Employees expressed disagreement with the need for a \$10,000 change on the application form that was suggested by M1 and approved by the director. To understand the phenomena, the researcher looked at the multiple instances where the manager rejected employees' ideas. A few times, an employee would strongly push for an idea to be implemented, and the manager would approve the suggestion. A lack of communication within the group that has developed. Employees and managers mentioned that it was difficult for the managers to initially give up control. An employee stated :

“I would say in the very beginning, she kind of made a point. She would overstep her boundaries, and then be like, Oh, wait, I'm not supposed to be leading this, I'm supposed to, you know, step back.”.

A manager also stated: *“I think it you know, it felt a little forced at first..”.* The researcher does not believe that the managers had bad intentions but had a different opinion of what was of value, reflected in one of their statements: *“it was kind of an issue where people were thinking of things that were, you know, just all over the place.”*

The high cost of a single change and the lack of agreement indicate a lack of lean implementation and a differing definition of value from certain double loop behavior. The lack of incentive from the manager indicates that involvement of other departments in performing double loop behavior should be encouraged so that the realization of benefits from double loop behavior is embraced by everyone involved.

Figure 5-5 summarizes how the employee and manager negative perceptions towards the double loop mindset can be used to guide the introduction of new concepts that would be attractive to the group.

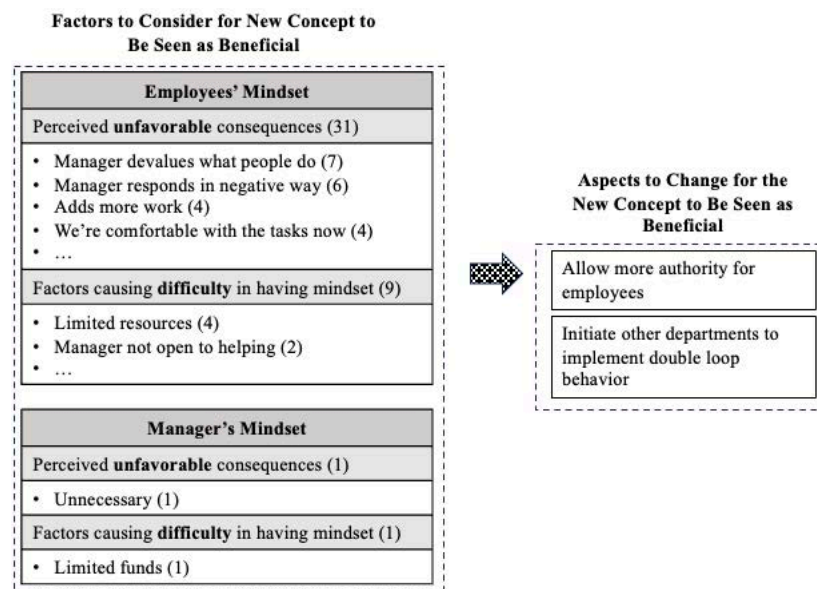


Figure 5-5 Summary of How Negative Perceptions Driving Rejection of Double Loop Mindset to Guide Acceptance of New Concepts

The same phenomenon seen in employees and managers was present when coding perceptions to satisfaction. Employees and managers increased satisfaction, mainly from the perceived consequences of engaging in double loop behavior, with the promotion of collaboration. Increased satisfaction in collaboration, representing the change to double loop behavior, is reflective of what was not present prior to the training but then systematically facilitated through huddles and expressed positively by the employees.

Unlike the managers, employees expressed dissatisfaction with engaging in double loop behavior. Employee dissatisfaction was mainly from perceived unfavorable consequences specifically with the lack of interest from managers in the resolution of

problems. From perceived difficulty in performing double loop behavior, employees were dissatisfied with the lack of independence. A lack of managers' understanding of employee needs was reflected in both perceived unfavorable consequences and difficulty in engaging double loop behavior. Since the employees main complaints seemed to be around the managers' behaviors, the researcher concluded that the difference in dissatisfaction was due to the difference of perspective in relation to how problems are viewed and consequently solved.

5.1.3 Supplemental Analysis

5.1.3.1 *Huddle Topics and Processing Times*

Based on the huddle topics, the registration department's suggested and implemented ideas were highest in the first couple of months (April- June) right after the training. The high number of suggested and implemented ideas is in accordance with the assessment of Mirdad's (2018) assessment of the group's full acceptance of the huddle concept. In alignment with employees' expressed difficulty in performing double loop behavior, the trend of huddle topics in eight months after training, in 2019, indicates that the number of announcements started to increase significantly in comparison to suggested ideas.

Processing times were reduced for all types of applications received by the registration department twenty months after training, which reflects the benefits of the double loop behaviors after the training since there were no other significant changes in the time period after training and twenty months after training.

5.1.3.2 *MUSA*

Twenty months after training, in 2020, prioritization of responsiveness and reliability aligns with the employees' main complaints at that time: difficulty with the managers accepting employees' various ideas and not helping employees deal with various problems.

The researcher, using MUSA, is limited to identifying which aspects of the work environment to prioritize to increase the registration department's satisfaction. However,

satisfaction through MUSA does not reflect employee perception specifically towards performing improvement behavior.

5.1.3.3 *Modified SERVPERF Survey Results*

Satisfaction in change management before training was scored lowest by both managers and employees, which is representative of the complaints from how the new software was introduced and implemented. Before the huddles, improvements were not present in the registration department however, through the huddles, many new changes were made as a group which explains the increasing satisfaction in change management both eight months and twenty months after training.

Eight months after the training, the employees experienced a decrease in satisfaction in “overall satisfaction”, “net promoter score” and “problem resolution”. Perceiving the organization more negatively can be a result of having a more double loop behavior/mindset and the organization has not appropriately changed in accordance with the behavior/mindset change. The problem resolution and change management questions are more representative with double loop behavior since the satisfaction questions include how problems are resolved and changes are handled. The low employee satisfaction with problem resolution in all three time periods indicate that the way problems were resolved in the registration department has been poorly executed.

5.1.4 Lessons Learned

5.1.4.1 *RQ1 – Lessons Learned*

Improvement behaviors are past improvement behaviors performed by the employee/manager. Improvement mindset is participants’ knowledge of the system, and ability to assess system health/effectiveness given desired outcomes. The perceptions the employees used to support their rejection of enhancing behavior and mindset before training were very similar. However, the employees expressed more reasons not to perform enhancing behavior (49 occurrences) than not having a double loop mindset (two occurrences). Retrieving relevant experiences in interviews is easier when asked to mention past behavior and explain why employees would not perform double loop behavior instead. On the contrary, employees expressed less perception when asked to

solve a current challenge in the work environment and then explain why they would not use a double loop solution. The lower number of perceptions from engaging in a mindset than a behavior was because the discussions around measuring mindset were mainly hypothetical and thus required more guesswork by the employee. Perceptions driving mindset and behavior still produced useful information since these findings represent the areas of work environment at the forefront of the employees' minds that influence the way the employees behave and think which helps guide the research team with a more effective approach in convincing the employees to accept double loop concepts in the training and sustain the behavior after training.

The manager was the main reason, twenty months after training, the employee group perceived performing enhancing behavior with unfavorable outcomes, felt social pressure not to engage, and perceived performing enhancing behavior as difficult. The emphasis on the manager's role in employees' perception found in this study aligns with the findings in the literature that the manager's role positively influences employees' perception of lean initiatives and adoption of lean (Camuffo, De Stefano, & Paolino, 2017; Gelei, Matyusz, & Losonci, 2015; Van Dun, Hicks, & Wilderom, 2017; Olivella, Cuatrecasas, & Gavilan 2008).

Employees perceived difficulty was found to be more than twice the perceived ease of performing double loop behavior. The employees experiencing loss of actual control of the behavior makes the employees less likely to carry out the intention of performing double loop behavior based on the theory of planned behavior. Assuming conditions stay the same, the employees will revert to single loop behavior eventually. In contrast, the managers did not experience difficulty but lacked incentive to continue performing double loop behavior. The main perception behind the manager not wanting to engage in a double loop mindset does not align with the significance of perceived difficulty in influencing a person's performance of a behavior as emphasized by the theory of planned behavior. Further research on multiple levels of management would see if this phenomenon is something that occurs specifically with improvement behavior.

During the training, the trainers were able to get the managers and employees on the same page in how they viewed current problems and how to solve them. However,

employees and managers tend to have different understandings of project “success” and “value” (Hille, 2016) because of their differing roles. Managers are concerned primarily with implementing company policies and procedures whereas employees are mainly concerned with performing work processes (Rasmussen, 1997). Therefore, improving communication is key to maintaining momentum (Worley & Doolen, 2006). However, communication will not be effective without respect for humanity (Emiliani, 2003). Respect of humanity might be difficult if perceived fairness is different between manager and employee (Komodromos & Halkias, 2015). There needs to be mutual trust in receiving the information from both the product and people value stream in order to have an accurate picture of the problems experienced in the system (Coetzee, van Dyk & van der Merwe, 2018).

5.1.4.2 *RQ2 - Lessons Learned*

There was a high level of dissatisfaction when looking at the coding of satisfaction from perceptions because the satisfaction measured reflected the change from single loop behavior before training to double loop behavior twenty months after training. Consequently, the employees will revert to single loop behavior if the organization does not improve in achieving employees’ expectations when performing double loop behavior.

The managers, in all three categories: perceived outcome, social pressure to engage and perceived ease in performing double loop enhancing behavior, experienced an increase in satisfaction and no dissatisfaction which aligns more with the theory of increased learning causing increased satisfaction. However, what the managers experienced is not an accurate depiction of the condition of the registration department because there is a difference in satisfaction between the employees and managers. The difference in satisfaction among different levels in the organization is not something new in the literature. Managers or people at higher levels of management tend to have higher satisfaction (Rukh, Choudhary & Abbasi, 2015).

The findings from the modified SERVPERF survey results show that if the implementation of change does not align with the employees’ value of success, then the misalignment will reflect in employee satisfaction. The length of time employees had to

perform double loop behavior should be reflected in their satisfaction. In the beginning, if the perceived difficulty and outcomes from performing the double loop behavior do not match up with what the employees expected through training, then dissatisfaction will be present. However, as time increases and the perceived consequences from the behavior remain the same, then employee expectations will lower, and the gap between consequences and expectations will be smaller, explaining the increase in twenty months satisfaction. The phenomenon is seen in employee dissatisfaction in 2019 from the modified SERVPERF survey results.

5.2 Summary of Discussion

Research question one asked, *“How do perceptions affect employee and manager improvement behavior?”*. Findings from the case study in this dissertation showed that identifying improvement behavior alone is insufficient to sustain the behavior. The employees were mentally ready to revert back to single loop conforming twenty months after training when the researcher looked deeper into the employee and manager mindset and the perceptions that drove employees’ and managers’ behaviors. The managers seemed content with the work environment in relation to the managers’ performance of double loop behavior. The researcher believes that due to the different roles employees and managers have, the managers and employees prioritize different things in terms of improvement efforts. Double loop behavior cannot be sustained as the dominant behavior in both groups if communication between employees and managers is not repaired.

Research question two asked, *“How is change in employee and manager improvement behaviors represented in satisfaction?”*. To answer research question two, satisfaction was measured from perceptions towards performing the dominant improvement behavior. The researcher was able to have a clearer understanding of which aspects of the work environment the organization should prioritize based on satisfaction since the satisfaction directly reflected perception towards double loop behavior.

The study provides a strong justification and methodology for future researchers to have more effective conceptual change based training to reach and sustain double loop behavior in lean implementations.

6 Conclusion

Despite the numerous benefits and widespread use of lean in organizations, a significant number of lean implementations have either failed in achieving desired performed results, had no benefits, or resulted in negative psychological or social outcomes. A critical success factor in lean implementation is training and the internalization of lean by the individuals involved. Research in lean training has increased recently, but the literature still lacks a customized approach to changing employee behavior through training. The conceptual change model argues that to fundamentally change a trainee's behavior, the understanding of lean at the cognitive level must first be changed. However, this research argues that the identification of the trainee's understanding of lean is not sufficient for effective behavioral change. Research question one identifies how trainees' perceptions drive the employees' current improvement behavior by complementing improvement behaviors with the leading theory in behavioral sciences, theory of planned behavior. Research question two identifies how satisfaction can reflect change with improvement behavior. Finally, the findings from research questions one and two are used to guide a conceptual change based training to effectively transition the zero loop or single loop behavior to double loop behavior.

6.1 Summary of Research Methodology

The study took place in the registration department of Organization O, a United States-based governmental service organization between 2018 and 2020. The research involved ten people from the registration department; two managers and eight employees.

Research question one asked, *“How do perceptions affect employee and manager improvement behavior?”*. The researcher investigated research question one through a qualitative approach using semi-structured interviews, field notes, and documents. Data was collected before training and twenty months after training. The researcher identified current improvement behaviors and mindset, along with the underlying perceptions. The negative perceptions of current improvement behavior/mindset, if not double loop, were used to facilitate cognitive conflict in training. Perceptions driving the rejection of engaging in double loop behavior/ mindset were used to determine factors in the work

environment to consider, which would increase the likelihood of validation and transfer of the new concept in training. Negative perceptions of current double loop behavior/mindset were used to guide which aspects of the work environment to prioritize to maintain double loop behavior.

Research question two asked, “*How is change in employee and manager improvement behaviors represented in satisfaction?*”. The researcher investigated research question two through a qualitative approach through semi-structured interviews. The researcher coded satisfaction from the perceptions of dominant behavior identified in research question one, in the qualitative analysis. The coded satisfaction was categorized based on the type of perception towards behavior. The change of satisfaction and dissatisfaction was analyzed with the change in behavior from before and twenty months after training. For a supplemental analysis of research question two, the modified SERVPERF survey was distributed before training, eight months after training, and twenty months after training. The areas of the work environment to prioritize were identified through MUSA, in a quantitative analysis.

6.2 Summary of Research Findings

Findings from this research showed that identifying improvement behavior alone is insufficient to guide efforts to sustain double loop behavior. Research question one evaluated the importance of perceptions driving the dominant improvement behavior. Research question two evaluated the change of satisfaction representing a change in behavior.

Data analysis from research question one found that despite employees most frequently mentioning single loop behavior, they expressed frustrations with difficulty in performing the behavior. However, managers mostly performed single loop behavior because of the perceived benefit. Findings before training show that managers and employees were unable to see how double loop behavior would benefit the department and that other people in the department would be unwilling to support double loop behavior.

During the ‘generate a meaningful conflict’ phase of the conceptual change based training, the employees, supported by the trainers, discussed concerns with the managers

in discussing ideas. Both managers and employees were happy to know that, ultimately, both sides want to work together, but the department currently does not facilitate the collaboration. The department then accepted the huddle concept and predominantly exhibited double loop behavior twenty months after training.

However, twenty months after the training, negative perceptions driving both employees' and managers' double loop behavior, along with the predominant single loop conforming mindset, represented that, without intervention, the managers and employees would eventually revert to single loop behavior. The negative perceptions driving the employees' double loop behavior mainly came from interactions with the managers. However, the managers mainly expressed positive perceptions towards performing double loop behavior.

Data analysis from research question two found that both employees' and managers' satisfaction increased representing the behavioral change from single loop to double loop, specifically with change management — collaboration. Employee dissatisfaction increased based on perceived consequences from engaging in double loop behavior, mainly in reliability — problem resolution and in perceived difficulty, mainly in empathy — needs and change management – learning. Unlike the employees, however, the managers did not express an increase in dissatisfaction with the change of behavior to double loop behavior.

6.3 Significance and Limitations

6.3.1 RQ1 - Significance and Limitations

Lean literature emphasizes the importance of employees' acceptance of lean in the beginning and the achievement of learning at the end of lean implementation to sustain lean benefits. Training is a top critical success factor because it is the main method to increase employees' understanding of lean. However, the lean training literature has not yet provided a method to identify perceptions specifically tied to the desired behavior for lean success, which is double loop. In addition, existing lean training research lacks tangible measurements of results on lean implementation, such as the number of ideas generated, implemented, and brought to fruition.

Through a longitudinal exploratory study, the researcher was able to find key perceptions as the drivers of improvement behavior using the theory of planned behavior (Ajzen, 1985) and quality improvement behaviors (Mazur et al., 2012). Using the identified perceptions, the researchers were able to use them to guide the conceptual change based training to achieve double loop behavior. The behaviors lasted twenty months after the training, reflected in process improvements and the number of suggested and implemented ideas in the huddles each month. After twenty months, key perceptions and issues were identified again to understand the evolution of learning at the behavioral and cognitive level, which can be used to guide further efforts so that the group does not revert to single loop. Figure 6-1 summarizes how the perceptions from dominant behavior are used to guide training and improvements.

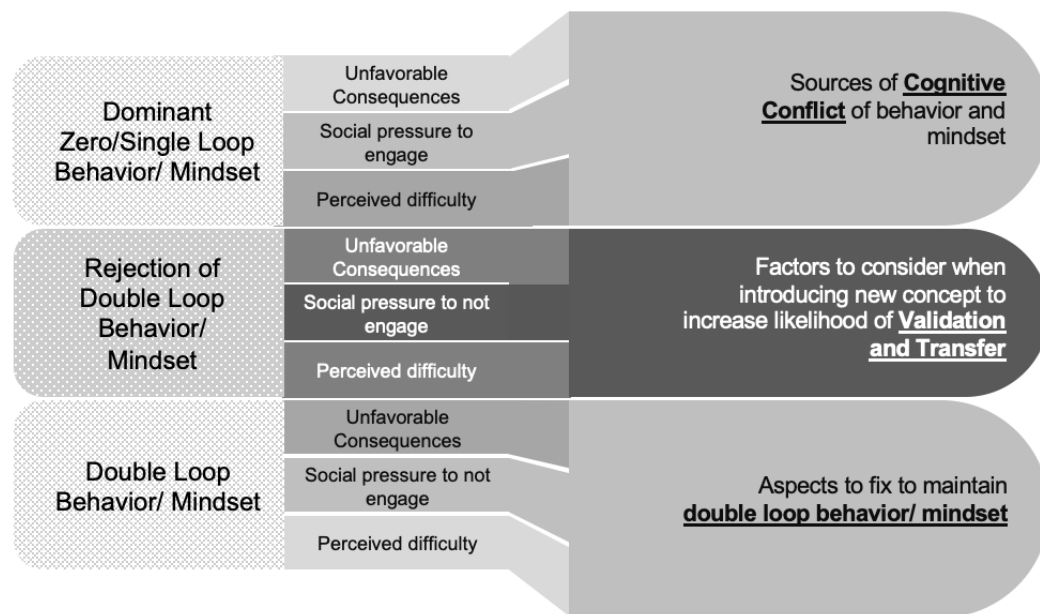


Figure 6-1 Summary of Using Perceptions to Guide Training and Improvements in the Workplace

In this research, perceptions driving improvement behavior were found to be higher in number than perceptions driving improvement mindset. Employees can retrieve relevant experiences regarding past behavior easier than when asked to justify they would solve a current challenge in the work environment a certain way. The latter question is hypothetical and thus requires more guesswork by the employee. Perceptions driving behavior and

mindset are both useful information since these perceptions represent areas of the work environment at the forefront of the employees' minds when employees behave and think.

Despite employees most frequently mentioning engagement in double loop behavior, employees perceived difficulty in performing the behavior. Perceived difficulty was more than twice the perceived ease in performing double loop behavior. As a result, employees perceived a single loop conforming mindset more favorable than double loop. However, the main perception behind the manager not wanting to engage in a double loop mindset does not align with the significance of perceived difficulty in influencing a person's performance of a behavior as emphasized by the theory of planned behavior. Further research on multiple levels of management would see if this phenomenon is something that occurs specifically with improvement behavior.

6.3.2 RQ2 – Significance and Limitations

The aim of employee satisfaction has been an extensive area of research in literature. Employee satisfaction and culture are critical to success in lean implementation because the satisfaction measured centers around employees, the main executors of lean, and the employees' perceptions of the work environment in which lean is implemented. The qualitative findings from the research question reflected the increase and decrease in satisfaction in accordance with the employees' perceptions of behavior.

Increased satisfaction has been tied to learning, but the measurement of satisfaction in relation to learning in the literature has mostly been a general view of how the employees view their work environment, which makes it difficult for organizations to identify accurately which aspect of the work environment to focus on to contribute to double loop behavior. The modified SERVPERF was the closest attempt at identifying which aspects of the work environment to prioritize for double loop behavior by adding employees' perceptions of change management as part of the measurement of satisfaction. However, the addition of satisfaction in change management is not specific enough to directly link to the performance of an improvement behavior. This dissertation showed a way to analyze satisfaction in a specific aspect of the work environment representing the change in single loop to double loop behavior.

6.4 Future Work

The results cannot be generalized since this was a single case study with a small group of people. However, this research yielded many questions that could potentially be used in future research. Implementing this research to a bigger organization and other industries would provide a deeper understanding of the employee-manager relationship, more insight into specific aspects of the work environment, and ease the survey formation of the data collection. Each of these will be discussed.

A bigger organization would provide insight into the perceptions and satisfaction of employees and managers at different levels in a vertical organizational structure. A bigger organization also provides insight into how perceptions and satisfaction vary among departments. Implementing this research on other or multiple industries would be useful insight into comparing which aspects of the work environment are a priority in transitioning or sustaining double loop behavior.

The modified SERVPERF (Grijalva, 2017) already provides a tool to measure employee satisfaction. For identifying improvement behavior, mindset and perceptions, future work can create a survey guided by Mazur's et al. (2012) quality improvement behaviors and Ajzen's (1985) theory of planned behavior. Since perceptions vary from one workplace to another, Ajzen (2020) suggests that in larger organizations, interview a representative sample of people first and then develop the survey. Once improvement behavior, mindset, and perceptions are structured in survey format, data can also be collected at more frequent periods of time and applicable to larger organizations. For small organizations, such as the one in this case study, more insight into perceptions of behavior and mindset would be gained through interviews and then creating a survey for future data collection.

The satisfaction survey provides more insight on which aspect of the work environment needs more attention when satisfaction, behavior, and perceptions were collected at multiple periods of time. If the study period was longer and involved a larger group of people, a survey could be created from the first round of interviews and then distributed at several points in time. In bigger organizations, improvement behaviors and

perceptions can be made into a survey and distributed to the whole organization, after interviewing a sample of employees (Ajzen, 2006).

6.5 Conclusion

This research investigated how to effectively transform improvement behaviors to double loop and then sustain double loop behavior as the dominant improvement behavior. To effectively change behavior with the conceptual change strategy, the theory of planned behavior suggests that the preparation phase in the strategy requires the identification of the driving perceptions of the employees' and managers' behavior. The current dominant improvement behavior and the driving perceptions were determined through a qualitative analysis.

Twenty months after the training, the registration department exhibited enthusiasm in performing double loop behavior. However, due to disappointment in interactions with the managers, the employees felt discouraged from continuously performing double loop behavior. The managers were also discouraged from continuing double loop behavior because compensation was not based on improvements in the registration department. For Organization O to maintain double loop behavior in the registration department, the aspects deterring the employees and managers identified in the negative perceptions from performing double loop behavior need to be improved in order to encourage further double loop behavior.

Employees' and managers' dissatisfaction with change management was the main SERVPERF aspects of the work environment to prioritize in double loop transformation before training. However, when collaboration was established after training, aspects such as empathy, reliability, change management and responsiveness were identified as the main SERVPERF aspects of the work environment to prioritize. This research found how satisfaction, which has been the most important and most frequently researched attitude in the literature, can capture employees' perception towards improvement behavior.

As this research has demonstrated, identifying perceptions and satisfaction that are specific to employee and manager behavior to guide the conceptual change based training provide a clear direction for organizational leaders to effectively achieve double loop

behavior in the workforce. Continuous monitoring of the main drivers of behavior helps the organization drive improvement and satisfaction within the organization.

7 Bibliography

- Adam, M., Hofbauer, M., & Stehling, M. (2021). Effectiveness of a lean simulation training: challenges, measures and recommendations. *Production Planning & Control*, 32(6), 443-453.
- Agarwal, S., Singh, R., & Upadhyay, C. K. (2022). Service Quality in the Healthcare Industry: A Literature Review and Research Agenda. *International Journal of Marketing & Business Communication*, 11(1).
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control: From cognition to behavior* (pp. 11-39). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I. (2002). Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personality and social psychology review*, 6(2), 107-122.
- Ajzen, I. (2006). Behavioral interventions based on the theory of planned behavior.
- Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, 2(4), 314-324.
- Al-Baik, O., & Miller, J. (2016, January). Kaizen cookbook: The success recipe for continuous learning and improvements. In *2016 49th Hawaii International Conference on System Sciences (HICSS)* (pp. 5388-5397). IEEE.
- Al-Haddad, S., & Kotnour, T. (2015). Integrating the organizational change literature: a model for successful change. *Journal of organizational change management*, 28(2), 234-262.
- Albliwi, S., & Antony, J. (2013). Implementation of a lean six sigma approach in the manufacturing Sector: a systematic literature review. In *Proceedings of the 11th International Conference on Manufacturing Research (ICMR2013)* (pp. 431-436). Cranfield University UK.
- Alegre, I., Mas-Machuca, M., & Berbegal-Mirabent, J. (2016). Antecedents of employee job satisfaction: Do they matter?. *Journal of Business Research*, 69(4), 1390-1395.
- Anand, G., Ward, P. T., Tatikonda, M. V., & Schilling, D. A. (2009). Dynamic capabilities through continuous improvement infrastructure. *Journal of operations management*, 27(6), 444-461.

- Amani, P., Lindbom, I., Sundström, B., & Östergren, K. (2015). Green-lean synergy-root-cause analysis in food waste prevention. *International Journal on Food System Dynamics*, 6(1012-2016-81250), 99-109.
- Antonsen, Y., & Bye, G. (2019). Lean task boards in healthcare, an improvement tool for tidying up the local chaos and promote professionalism.
- Antony, J., Psomas, E., Garza-Reyes, J. A., & Hines, P. (2021). Practical implications and future research agenda of lean manufacturing: a systematic literature review. *Production planning & control*, 32(11), 889-925.
- Aragon, T. J. (2017). PDSA Problem Solving: With a gentle introduction to double-loop learning, program theory, and causal graphs.
- Argiyantari, B., Simatupang, T. M., & Basri, M. H. (2022). Transportation performance improvement through lean thinking implementation. *International Journal of Lean Six Sigma*, 13(3), 622-647.
- Argyris, C. (1976). Single-loop and double-loop models in research on decision making. *Administrative science quarterly*, 363-375.
- Argyris, C. (2002). Double-loop learning, teaching, and research. *Academy of management learning & education*, 1(2), 206-218.
- Argyris, C., & Schon, D. (1974). *Theory in practice: Increasing professional effectiveness*. Jossey-Bass.
- Ashtiani, N. N., Bhuiyan, N., & Zanjani, M. K. (2017). Lean leadership practices-a literature review. *Ind Eng Manage*, 6(226), 2169-0316.
- Asubonteng, P., McCleary, K. J., & Swan, J. E. (1996). SERVQUAL revisited: a critical review of service quality. *Journal of Services marketing*, 10(6), 62-81.
- Babchuk, N. (1962). The role of the researcher as participant observer and participant-as-observer in the field situation. *Human organization*, 21(3), 225-228.
- Bagodi, V., & Mahanty, B. (2013). Double loop learning in the Indian two-wheeler service sector. *The Learning Organization*, 20(4/5), 264-278.
- Bakke, A. L., & Johansen, A. (2019). Implementing of Lean—challenges and lessons learned. *Procedia Computer Science*, 164, 373-380.
- Ballard, G., & Howell, G. (2003). Lean project management. *Building Research & Information*, 31(2), 119-133.

- Ballé, M., Chaize, J., & Jones, D. (2019). Lean as a learning system: What do organizations need to do to get the transformational benefits from Toyota's method?. *Development and Learning in Organizations: An International Journal*, 33(3), 1-4.
- Basin, S., & Burcher, P. (2006). Lean viewed as a lean philosophy. *Journal of Manufacturing Technology Management*, 17(1), 56-72.
- Bateson, G. (1972). The logical categories of learning and communication. *Steps to an Ecology of Mind*, 279-308.
- Belbacha, M. (2016). Towards Understanding the Concept of Change. *International Journal of Education and Research*, 4(1), 347-362.
- Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behaviour. *Technovation*, 21(2), 67-77.
- Bessant, J., & Francis, D. (1999). Developing strategic continuous improvement capability. *International journal of operations & production management*, 19(11), 1106-1119.
- Bhamu, J., & Singh Sangwan, K. (2014). Lean manufacturing: literature review and research issues. *International Journal of Operations & Production Management*, 34(7), 876-940.
- Bosnjak, M., Ajzen, I., & Schmidt, P. (2020). The theory of planned behavior: Selected recent advances and applications. *Europe's Journal of Psychology*, 16(3), 352.
- Camuffo, A., De Stefano, F., & Paolino, C. (2017). Safety reloaded: lean operations and high involvement work practices for sustainable workplaces. *Journal of Business Ethics*, 143, 245-259.
- Chapman, J. M. H. (2014). *Researcher as participant: Safeguarding against bias in a qualitative case study*. SAGE Publications, Ltd..
- Chiva, R., & Habib, J. (2015). A framework for organizational learning: zero, adaptive and generative learning. *Journal of Management & Organization*, 21(3), 350-368.
- Coetzee, R., Van Dyk, L., & Van der Merwe, K. R. (2019). Towards addressing respect for people during lean implementation. *International Journal of Lean Six Sigma*, 10(3), 830-854.
- Crawford, M. L. (2001). Research, rationale, and techniques for improving student motivation and achievement in mathematics and science. *Leading Change of Education, hlm. iii-iv dan hlm*, 1-18.

- Cronin Jr, J. J., & Taylor, S. A. (1992). Measuring service quality: a reexamination and extension. *Journal of marketing*, 56(3), 55-68.
- Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *Academy of management review*, 9(2), 284-295.
- Dahlgaard, J. J., & Mi Dahlgaard-Park, S. (2006). Lean production, six sigma quality, TQM and company culture. *The TQM magazine*, 18(3), 263-281.
- Dahlgaard, S. M. P. (2000). *From ancient philosophies to TQM and modern management theories* (Doctoral dissertation, Linköpings universitet).
- de Castro Vila, R., & Leal, G. G. (2017). Training Lean Thinkers. *Dirección y Organización*, 47-54.
- Deif, A. (2017). Insights on lean gamification for higher education. *International Journal of Lean Six Sigma*, 8(3), 359-376.
- DeVellis, R.F., 1991, Scale Development: Theory and Application, Sage Publishing.
- Doolen, T. L., Worley, J., Van Aken, E. M., & Farris, J. (2003). Development of an assessment approach for Kaizen events. In *IIE Annual Conference. Proceedings* (p. 1). Institute of Industrial and Systems Engineers (IISE).
- Dyer Jr, W. G., & Wilkins, A. L. (1991). Better stories, not better constructs, to generate better theory: A rejoinder to Eisenhardt. *Academy of management review*, 16(3), 613-619.
- Edmondson, A. C. (2002). The local and variegated nature of learning in organizations: A group-level perspective. *Organization science*, 13(2), 128-146.
- Egan, T. M., Yang, B., & Bartlett, K. R. (2004). The effects of organizational learning culture and job satisfaction on motivation to transfer learning and turnover intention. *Human resource development quarterly*, 15(3), 279-301.
- Emiliani, M. L. (1998). Lean behaviors. *Management decision*, 36(9), 615-631.
- Emiliani, M. L. (2003). Linking leaders' beliefs to their behaviors and competencies. *Management Decision*, 41(9), 893-910.
- Filmore, P. (2008). A comparison of the problem solving and creativity potential of engineers between using TRIZ and Lean/Six Sigma. In *The fourth TRIZ symposium in Japan*.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Taylor & Francis.

Flumerfelt, S., Alves, A. C., Leão, C. P., & Wade, D. L. (2016). What do organizational leaders need from lean graduate programming. *European Journal of Training and Development*, 40(5), 302-320.

Freitas, R. D. C., Freitas, M. D. C. D., Gomes de Menezes, G., & Odorczyk, R. S. (2018). Lean Office contributions for organizational learning. *Journal of Organizational Change Management*, 31(5), 1027-1039.

Gelei, A., Losonci, D., & Matyusz, Z. (2015). Lean production and leadership attributes—the case of Hungarian production managers. *Journal of Manufacturing Technology Management*, 26(4), 477-500.

Gemmel, P., Van Beveren, S., Landry, S., & Meijboom, B. (2019). Problem-solving behaviour of nurses in a lean environment. *Journal of nursing management*, 27(1), 35-41.

Genskow, K. D., & Wood, D. M. (2009). Measurement, learning, and adaptation in planning and implementing voluntary nonpoint source watershed programs. *Journal of Planning Literature*, 24(2), 137-154.

Ghobadian, A., Talavera, I., Bhattacharya, A., Kumar, V., Garza-Reyes, J. A., & O'regan, N. (2020). Examining legitimatisation of additive manufacturing in the interplay between innovation, lean manufacturing and sustainability. *International Journal of Production Economics*, 219, 457-468.

Gomera, A., Antúnez, M., & Villamandos, F. (2020). Universities that learn to tackle the challenges of sustainability: case study of the university of cordoba (Spain). *Sustainability*, 12(16), 6614.

Gomez Segura, M., Oleghe, O., & Salonitis, K. (2020). Analysis of lean manufacturing strategy using system dynamics modelling of a business model. *International Journal of Lean Six Sigma*, 11(5), 849-877.

Goodridge, D., Rana, M., Harrison, E. L., Rotter, T., Dobson, R., Groot, G., ... & Lloyd, J. (2018). Assessing the implementation processes of a large-scale, multi-year quality improvement initiative: survey of health care providers. *BMC health services research*, 18(1), 1-22.

Goodridge, D., Westhorp, G., Rotter, T., Dobson, R., & Bath, B. (2015). Lean and leadership practices: development of an initial realist program theory. *BMC health services research*, 15(1), 1-15.

Grigg, N. P., Goodyer, J. E., & Frater, T. G. (2020). Sustaining lean in SMEs: key findings from a 10-year study involving New Zealand manufacturers. *Total Quality Management & Business Excellence*, 31(5-6), 609-622.

Grigoroudis, E., & Siskos, Y. (2002). Preference disaggregation for measuring and analysing customer satisfaction: The MUSA method. *European Journal of Operational Research*, 143(1), 148-170.

Grijalva, P. (2016). A tool to assess continuous improvement culture: Adapting SERVQUAL scale to measure employee satisfaction, and identify factors of success. In Proceedings of the International Annual Conference of the American Society for Engineering Management. (pp. 1-10). American Society for Engineering Management (ASEM).

Grijalva, P. (2017). Assessing organizational culture and employee satisfaction at a healthcare facility. In *IIE Annual Conference. Proceedings* (pp. 1735-1740). Institute of Industrial and Systems Engineers (IISE).

Grijalva, P., & Eseonu, C., PhD. (2016). *A Tool To Assess Continuous Improvement Culture: Adapting Servqual Scale To Measure Employee Satisfaction, And Identify Factors Of Success*. American Society for Engineering Management (ASEM).

Gupta, S., Sharma, M., & Sunder M, V. (2016). Lean services: a systematic review. *International Journal of productivity and performance management*, 65(8), 1025-1056.

Hansen, D. (2014). Decoding the productivity code: Towards an improvement theory for sustainable organizational performance.

Hansen, D., & Møller, N. (2016). Conceptualizing dynamic capabilities in lean production: what are they and how do they develop?. *Engineering Management Journal*, 28(4), 194-208.

Haukåsen, O. A., & Hermanrud, I. (2023). Creating a lean mind-set: Change of practice towards early treatment. *Management Learning*, 54(5), 777-801.

Henrique, D. B., & Godinho Filho, M. (2020). A systematic literature review of empirical research in Lean and Six Sigma in healthcare. *Total Quality Management & Business Excellence*, 31(3-4), 429-449.

Higuchi, Y., Nam, V. H., & Sonobe, T. (2015). Sustained impacts of Kaizen training. *Journal of Economic Behavior & Organization*, 120, 189-206.

Hille, J. D. (2016). Towards a Conceptual Change Model to Support Organizational Change Efforts.

Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: a review of contemporary lean thinking. *International journal of operations & production management*, 24(10), 994-1011.

- Hirota, E. H., Lantelme, E. M. V., & Formoso, C. T. (1999). Learning how to learn lean construction concepts and principles. In *Proceedings IGLC* (Vol. 7, p. 411).
- Holweg, M., Staats, B. R., & Upton, D. M. (2018). Making process improvements stick. *Kenan Institute of Private Enterprise research paper*, (18-22).
- Hu, Q., Found, P., Williams, S., & Mason, R. (2016). Lean thinking and organisational learning: how can they facilitate each other?. *Understanding the Lean Enterprise: Strategies, Methodologies, and Principles for a More Responsive Organization*, 61-77.
- Hu, Q., Found, P., Williams, S. J., & Mason, R. J. (2012). The connection between organizational learning and Lean production.
- Ingelsson, P., Bäckström, I., & Snyder, K. (2020). Adapting a Lean leadership-training program within a health care organization through cocreation. *International Journal of Quality and Service Sciences*, 12(1), 15-28.
- Jaaron, A. A., & Backhouse, C. J. (2017). Operationalising “double-loop” learning in service organisations: a systems approach for creating knowledge. *Systemic Practice and Action Research*, 30, 317-337.
- Jackson, R. W., Wood, C. M., & Zboja, J. J. (2013). The dissolution of ethical decision-making in organizations: A comprehensive review and model. *Journal of Business Ethics*, 116, 233-250.
- Janjić, V., Todorović, M., & Jovanović, D. (2020). Key success factors and benefits of Kaizen implementation. *Engineering Management Journal*, 32(2), 98-106.
- Jenkin, T. A., Webster, J., & McShane, L. (2011). An agenda for ‘Green’ information technology and systems research. *Information and organization*, 21(1), 17-40.
- Ju, B., Lee, Y., Park, S., & Yoon, S. W. (2021). A meta-analytic review of the relationship between learning organization and organizational performance and employee attitudes: using the dimensions of learning organization questionnaire. *Human resource development review*, 20(2), 207-251.
- Judge, T. A., Weiss, H. M., Kammeyer-Mueller, J. D., & Hulin, C. L. (2017). Job attitudes, job satisfaction, and job affect: A century of continuity and of change. *Journal of applied psychology*, 102(3), 356.
- Kakouris, A., Sfakianaki, E., & Tsioufis, M. (2022). Lean thinking in lean times for education. *Annals of Operations Research*, 316(1), 657-697.

- Keung, C. K. (2013, July). Management of innovation and the participation society: The case of organization learning of IBM Shenzhen Branch. In *2013 Suzhou-Silicon Valley-Beijing International Innovation Conference* (pp. 316-319). IEEE.
- Kolawole, O. A., Mishra, J. L., & Hussain, Z. (2021). Addressing food waste and loss in the Nigerian food supply chain: Use of Lean Six Sigma and Double-Loop Learning. *Industrial marketing management*, 93, 235-249.
- Kolb, B. (1984). Functions of the frontal cortex of the rat: a comparative review. *Brain research reviews*, 8(1), 65-98.
- Komodromos, M., & Halkias, D. (2015). *Organizational justice during strategic change: The employee's perspective*. Burlington, VT: Gower Publishing Company.
- Krafcik, J. F. (1988). Triumph of the lean production system. *Sloan management review*, 30(1), 41-52.
- Langer, E. J., & Piper, A. I. (1987). The prevention of mindlessness. *Journal of personality and social psychology*, 53(2), 280.
- Liker, J. K. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer*. McGraw-Hill New York.
- Lista, A. P., Tortorella, G. L., Bouzon, M., Thürer, M., & Jurburg, D. (2022). Soft and hard skills development in lean management trainings. *International Journal of Lean Six Sigma*, 13(5), 1137-1158.
- Leyer, M., Reus, M., & Moormann, J. (2021). How satisfied are employees with lean environments?. *Production Planning & Control*, 32(1), 52-62.
- Lloyd, D. (2000). *Improving employee commitment* (Doctoral dissertation, Concordia University).
- Loerzel, T. (2014). Put Your Employees First and Your Clients Second during Busy Season. *CPA Prac. Mgmt. F.*, 10, 12.
- Luz Tortorella, G., Miorando, R., Fettermann, D., & Tlapa Mendoza, D. (2020). An empirical investigation on learning and teaching lean manufacturing. *Education+ Training*, 62(3), 339-354.
- Machado Guimarães, C., & Crespo de Carvalho, J. (2014). Assessing lean deployment in healthcare—a critical review and framework. *Journal of Enterprise Transformation*, 4(1), 3-27.

- Mansoori, Y. (2017). Enacting the lean startup methodology: The role of vicarious and experiential learning processes. *International Journal of Entrepreneurial Behavior & Research*, 23(5), 812-838.
- Markova, T. (2009). *Institutional change processes under the joined impact of government, multinationals, and local practices*. University of Groningen.
- Martinez Ibañez, V., Ochoa de Echagüen, A., Campos, A., & Romea, S. (2022). Creating efficient professional healthcare organizations. *International Journal of Healthcare Management*, 15(2), 158-164.
- Martínez-Jurado, P. J., & Moyano-Fuentes, J. (2014). Lean management, supply chain management and sustainability: a literature review. *Journal of Cleaner Production*, 85, 134-150.
- Mason, S. E., Nicolay, C. R., & Darzi, A. J. T. S. (2015). The use of Lean and Six Sigma methodologies in surgery: a systematic review. *The Surgeon*, 13(2), 91-100.
- Mays, N., & Pope, C. (1995). Qualitative research: rigour and qualitative research. *Bmj*, 311(6997), 109-112.
- Mazur, L. M., McCreery, J. K., & Chen, S. J. G. (2012). Quality improvement in hospitals: Identifying and understanding behaviors. *Journal of Healthcare Engineering*, 3, 621-648.
- Mazur, L., McCreery, J., & Rothenberg, L. (2012). Facilitating lean learning and behaviors in hospitals during the early stages of lean implementation. *Engineering Management Journal*, 24(1), 11-22.
- McLean, R. S., Antony, J., & Dahlgaard, J. J. (2017). Failure of Continuous Improvement initiatives in manufacturing environments: a systematic review of the evidence. *Total Quality Management & Business Excellence*, 28(3-4), 219-237.
- Messaoudene, Z. (2019). Lean thinking as a learning strategy at the service of global development. *Lean Engineering for Global Development*, 33-60.
- Meyers, F. S. (1990). Japan's Henry Ford. *Scientific Amer*, 262(5), 98.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage Publications Inc.
- Miller, R. J., & Maellaro, R. (2016). Getting to the root of the problem in experiential learning: Using problem solving and collective reflection to improve learning outcomes. *Journal of Management Education*, 40(2), 170-193.

- Minier, N. (2014). Implementing Performance Measurement to support Continuous Improvement: An empirical case study in construction industry.
- Minh, N. D., & Kien, D. T. (2021). A four-phase framework for Lean implementation in small and medium enterprises. *Management*, 25(1), 259-277.
- Mirdad, W. K. (2018). Using Conceptual Change to Improve Lean Implementation Quality.
- Mirdad, W. K., & Eseonu, C. I. (2015). A conceptual map of the lean nomenclature: comparing expert classification to the lean literature. *Engineering Management Journal*, 27(4), 188-202.
- Mirdad, W. K., Hille, J., & Melamed, J. T. (2015). Application of resilient systems thinking to sustain a lean organizational culture. In *Proceedings of the International Annual Conference of the American Society for Engineering Management*. (p. 1). American Society for Engineering Management (ASEM).
- Monks, T., Robinson, S., & Kotiadis, K. (2014). Learning from discrete-event simulation: Exploring the high involvement hypothesis. *European Journal of Operational Research*, 235(1), 195-205.
- Moosa, K., & Sajid, A. (2010). Critical analysis of Six Sigma implementation. *Total Quality Management*, 21(7), 745-759.
- Moraros, J., Lemstra, M., & Nwankwo, C. (2016). Lean interventions in healthcare: do they actually work? A systematic literature review. *International journal for quality in health care*, 28(2), 150-165.
- Netland, T. H., & Powell, D. J. (2017). A lean world. *The Routledge companion to lean management*, 465-473.
- Nevalainen, T., Seikkula-Leino, J., & Salomaa, M. (2021). Team learning as a model for facilitating entrepreneurial competences in higher education: The case of proakatemia. *Sustainability*, 13(13), 7373.
- Nordin, E., & Sebila, D. (2017). Company-specific production systems' effect on continuous improvement work and organizational learning: A case study on Volvo Group Trucks Operations.
- Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. Cambridge University press.
- Nussbaum, J., & Novick, S. (1982). Alternative frameworks, conceptual conflict and accommodation: Toward a principled teaching strategy. *Instructional science*, 183-200.

- Nyström, M. E., Höög, E., Garvare, R., Andersson Bäck, M., Terris, D. D., & Hansson, J. (2018). Exploring the potential of a multi-level approach to improve capability for continuous organizational improvement and learning in a Swedish healthcare region. *BMC health services research*, 18(1), 1-19.
- Olivella, J., Cuatrecasas, L., & Gavilan, N. (2008). Work organisation practices for lean production. *Journal of Manufacturing Technology Management*, 19(7), 798-811.
- Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1991). Refinement and reassessment of the SERVQUAL scale. *Journal of retailing*, 67(4), 420.
- Pearce, A. D., & Pons, D. J. (2017). Defining lean change—Framing lean implementation in organizational development.
- Pedler, M., & Abbott, C. (2013). *EBOOK: Facilitating Action Learning: A Practitioner's Guide*. McGraw-Hill Education (UK).
- Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Toward a theory of conceptual change. *Science education*, 66(2), 211-227.
- Powell, D., & Coughlan, P. (2020). Corporate lean programs: practical insights and implications for learning and continuous improvement. *Procedia CIRP*, 93, 820-825.
- Rafferty, A. E., & Minbashian, A. (2019). Cognitive beliefs and positive emotions about change: Relationships with employee change readiness and change-supportive behaviors. *Human Relations*, 72(10), 1623-1650.
- Rahbek Gjerdrum Pedersen, E., & Huniche, M. (2011). Determinants of lean success and failure in the Danish public sector: a negotiated order perspective. *International journal of public sector management*, 24(5), 403-420.
- Rasmussen, J. (1997). Risk management in a dynamic society: A modelling problem. *Safety Science*, 27(2/3), 183-213.
- Ringen, G., & Holtskog, H. (2013). How enablers for lean product development motivate engineers. *International Journal of Computer Integrated Manufacturing*, 26(12), 1117-1127.
- Rinke, M. L., Mock, C. K., Persing, N. M., Sawyer, M., Haut, E. R., Neufeld, N. J., & Nagy, P. (2016). The Armstrong Institute Resident/Fellow Scholars: a multispecialty curriculum to train future leaders in patient safety and quality improvement. *American Journal of Medical Quality*, 31(3), 224-232.
- Robinson, O. (1990). Employment policies in the service sector: training in retail distribution. *Service Industries Journal*, 10(2), 284-305.

- Rodgers, B., & Antony, J. (2019). Lean and Six Sigma practices in the public sector: a review. *International journal of quality & reliability management*, 36(3), 437-455.
- Romero, D., Gaiardelli, P., Wuest, T., Powell, D., & Thürer, M. (2020). New forms of Gemba walks and their digital tools in the digital lean manufacturing world. In *Advances in Production Management Systems. Towards Smart and Digital Manufacturing: IFIP WG 5.7 International Conference, APMS 2020, Novi Sad, Serbia, August 30–September 3, 2020, Proceedings, Part II* (pp. 432-440). Springer International Publishing.
- Ross, P. T., Abdoler, E., Flygt, L., Mangrulkar, R. S., & Santen, S. A. (2018). Using a modified A3 lean framework to identify ways to increase students' reporting of mistreatment behaviors. *Academic Medicine*, 93(4), 606-611.
- Rubin, H. J., & Rubin, I. S. (2011). *Qualitative interviewing: The art of hearing data*. sage.
- Rukh, L., Choudhary, M. A., & Abbasi, S. A. (2015). Analysis of factors affecting employee satisfaction: A case study from Pakistan. *Work*, 52(1), 137-152.
- Saldaña, J. (2016). *The coding manual for qualitative researchers*. Sage Publications Inc.
- Salentijn, W., Beijer, S., & Antony, J. (2021). Exploring the dark side of Lean: a systematic review of the lean factors that influence social outcomes. *The TQM Journal*, 33(6), 1469-1483.
- Sanchez, L., & Blanco, B. (2014). Three decades of continuous improvement. *Total Quality Management & Business Excellence*, 25(9-10), 986-1001.
- Scott, F. M., Butler, J., & Edwards, J. (2001). Does lean production sacrifice learning in a manufacturing environment? An action learning case study. *Studies in Continuing Education*, 23(2), 229-241.
- Scoville, R., Little, K., Rakover, J., Luther, K., & Mate, K. (2016). Sustaining improvement. *Institute for Healthcare Improvement White Papers*. Cambridge, Massachusetts: Institute for Healthcare Improvement, 2016. Available: <http://www.ihl.org/resources/Pages/IHIWhitePapers/Sustaining-Improvement.aspx>
- Siggelkow, N. (2007). Persuasion with case studies. *Academy of management journal*, 50(1), 20-24.
- Singh, J., & Singh, H. (2015). Continuous improvement philosophy—literature review and directions. *Benchmarking: An International Journal*, 22(1), 75-119.
- Snell, R., & Chak, A. M. K. (1998). The learning organization: learning and empowerment for whom?. *Management learning*, 29(3), 337-364.

Steinmetz, H., Knappstein, M., Ajzen, I., Schmidt, P., & Kabst, R. (2016). How effective are behavior change interventions based on the theory of planned behavior?. *Zeitschrift für Psychologie*.

Stelson, P., Hille, J., Eseonu, C., & Doolen, T. (2017). What drives continuous improvement project success in healthcare?. *International journal of health care quality assurance*, 30(1), 43-57.

Strauss, A., & Corbin, J. (1994). Grounded theory methodology: An overview.

Tan, A. B., van Dun, D. H., & Wilderom, C. P. (2023). Lean innovation training and transformational leadership for employee creative role identity and innovative work behavior in a public service organization. *International Journal of Lean Six Sigma*.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53.

Taylor, D., & Brunt, D. (2001). Manufacturing operations and supply chain management: the lean approach.

Tenkasi, R. R. V. (2018). Re-visiting the Past to Re-imagine the Future of Organization Development and Change. *Organization Development Journal*, 36(4).

Testani, M. V., & Ramakrishnan, S. (2012). Lean leadership readiness for change: A methodology for lean change readiness and continuous improvement. In *IIE Annual Conference. Proceedings* (p. 1). Institute of Industrial and Systems Engineers (IISE).

Trakulsunti, Y., Antony, J., Dempsey, M., & Brennan, A. (2021). Reducing medication errors using lean six sigma methodology in a Thai hospital: an action research study. *International Journal of Quality & Reliability Management*, 38(1), 339-362.

Tortorella, G. L., Marodin, G. A., Miorando, R., & Seidel, A. (2015). The impact of contextual variables on learning organization in firms that are implementing lean: a study in Southern Brazil. *The International Journal of Advanced Manufacturing Technology*, 78, 1879-1892.

Tucker, A. L., & Edmondson, A. C. (2003). Why hospitals don't learn from failures: Organizational and psychological dynamics that inhibit system change. *California management review*, 45(2), 55-72.

Turesky, E. F., & Connell, P. (2010). Off the rails: understanding the derailment of a lean manufacturing initiative. *Organization Management Journal*, 7(2), 110-132.

Turi, J. A., Sorooshian, S., Ghani, M. F. A., Javed, Y., & Ali, A. (2017). Organizational learning: Prospective on employees readiness using information system supported learning. *MOJEM: Malaysian Online Journal of Educational Management*, 6(1), 68-94.

Weiss, R. S. (1995). *Learning from strangers: The art and method of qualitative interview studies*. Simon and Schuster.

Womack, J. P., Jones, D. T., & Ross, D. (1990). *The Machine that Changed the World* (MM INTERNATIONAL Ed.).

Worley, J. M. (2005). The role of sociocultural factors in a lean manufacturing implementation.

Worley, J. M., & Doolen, T. L. (2006). The role of communication and management support in a lean manufacturing implementation. *Management Decision*, 44(2), 228–245.

van der Merwe, K. R. (2017). A longitudinal study of the efficacy of lean learning experienced through a simulated working environment (SWE). *International Journal of Productivity and Performance Management*, 66(5), 651-661.

Van Dun, D. H., Hicks, J. N., & Wilderom, C. P. (2017). Values and behaviors of effective lean managers: Mixed-methods exploratory research. *European management journal*, 35(2), 174-186.

Vanichchinchai, A. (2021). Assessing lean satisfaction and its enablers: a care provider perspective. *Operations Management Research*, 14(1-2), 95-106.

Vest, J. R., & Gamm, L. D. (2009). A critical review of the research literature on Six Sigma, Lean and StuderGroup's Hardwiring Excellence in the United States: the need to demonstrate and communicate the effectiveness of transformation strategies in healthcare. *Implementation Science*, 4, 1-9.

Yin, R. K. (1994). Discovering the future of the case study. Method in evaluation research. *Evaluation practice*, 15(3), 283-290.

York, J. M. (2021). The impact of the Lean Startup in advancing innovative products and business models: An organizational learning perspective. *International Journal of Management Studies and Social Science Research*, 1(1), 87-118.

Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization science*, 13(3), 339-351.

8 Appendices

8.1 Appendix 1: Consent Form for Survey

Consent for the survey:

Dear Participant,

Thank you for your willingness to participate in this research on Understanding Factors for Sustainable Continuous Improvement. This research aims to understand how certain factors affect the implementation of projects in the workplace. The survey will be used to collect data on these factors. The type of questions will try to understand the culture and satisfaction level of the employees. Dr. Chinweike Eseonu and the Process Improvement Group (PIGroup) at Oregon State University need your help in completing the attached survey. We appreciate your help.

Voluntary Participation

Your participation is voluntary. You are not required to respond to any of the questions, but we greatly appreciate your response to all questions. Whether or not you participate will not in any way affect your work status, nor will it be known by your supervisor. The survey should take approximately 20 minutes or less.

Confidentiality

You are not required to provide your name or other identifying information. However, to match your responses for better understanding, we will link the before and after surveys. Your name and email will not be stored in the same file as the survey data to prevent a breach of confidentiality. Only a random ID number will be used to identify your data. We will take all measures to keep your data confidential. Only the principal investigator (Dr. Eseonu) and the student researchers will have access to the interview results. **Results will be reported back to the organization in a summarized and anonymous form.** Please complete the survey in a time/manner where others will not be able to see your screen if you would not like others to see it.

Data Usage

The data will only be used for this study and not for future research.

Eligibility

You must be at least 18 years old to participate in this study.

We appreciate that your time is very valuable and thank you for your help in shaping our knowledge of sustainable process improvement initiatives.

Please contact Dr. Eseonu (chinweike.eseonu@oregonstate.edu or 541.737.0024) if you have any questions or comments about the survey. If you have questions about your rights as a research participant, please contact the Institutional Review Board (IRB) at Oregon State University (email: irb@oregonstate.edu or 541.737.8008).

8.2 Appendix 2: Consent Form for Interview

Consent for the interview:

Study Title: Understanding Factors for Sustainable Continuous Improvement

Hi, I am Mina Azhar, a student researcher from PIGroup. Thank you for your willingness to participate in this research on Understanding Factors for Sustainable Continuous Improvement. This research aims to understand how certain factors affect the implementation of projects in the workplace. The interview will be used to collect data on these factors. The type of questions will try to understand the culture and mindset of the employees. Dr. Chinweike Eseonu and the Process Improvement Group (PIGroup) at Oregon State University need your help in answering a couple of questions.

Your participation is voluntary. You are not required to respond to any of the questions, but we greatly appreciate your response to all questions. The interview should take approximately 20 minutes or less. Whether or not you participate will not in any way affect your work status, nor will it be known by your supervisor. The data will only be used for this study and not future research.

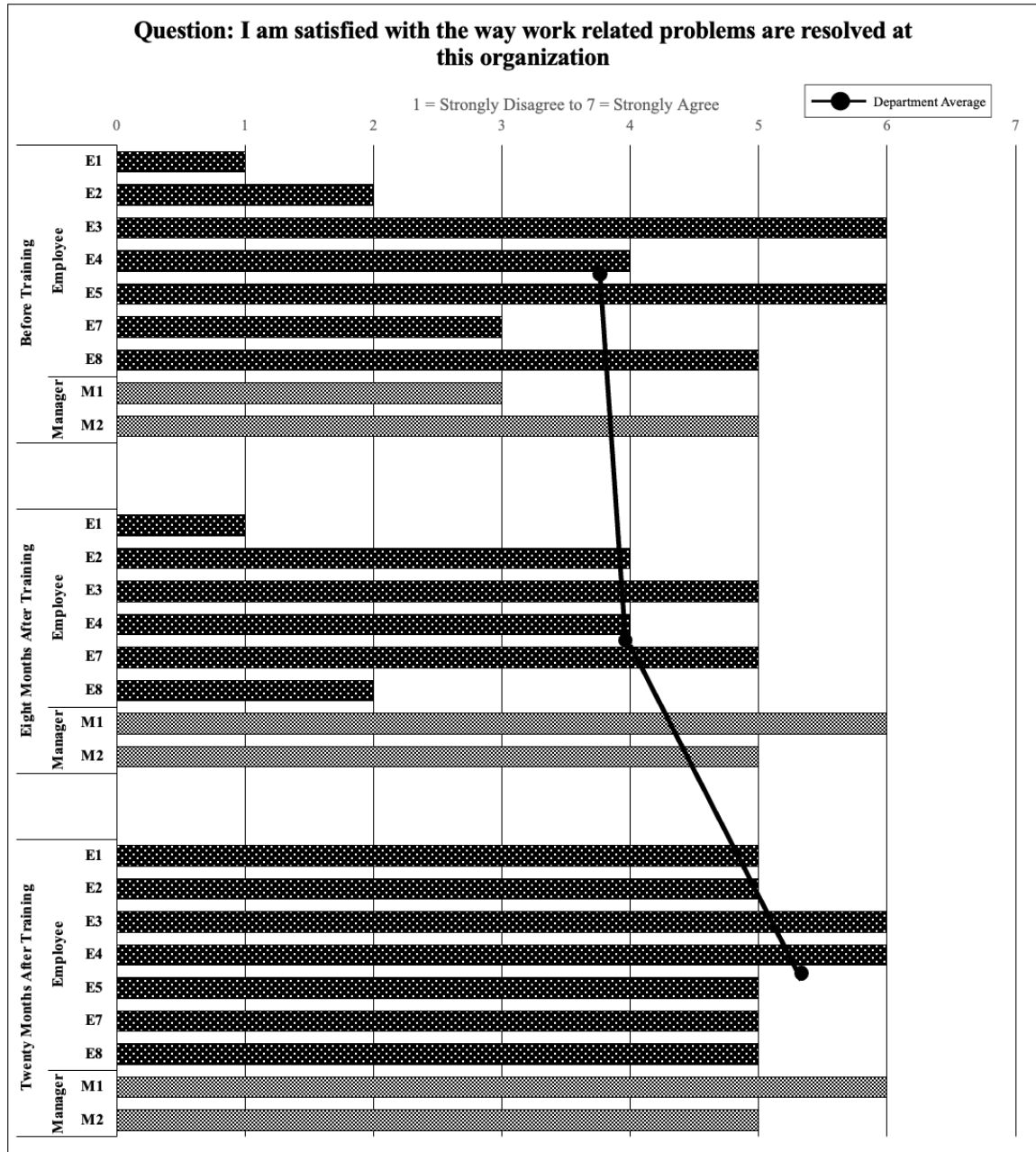
We will do an audio recording of transcripts of the interview and then discard them right after verification. Recording is used to ensure accurate information when doing analyses. We will not directly link your data with your name from this interview but use a random ID so that no one can identify it is you directly. The ID is necessary to match your responses before and after to improve our understanding of your condition. We will take all measures to keep your data confidential. Only the principal investigator (Dr. Eseonu) and the student researchers will have access to the interview results. **Results will be reported back to the organization in a summarized and anonymous form.**

We have chosen this room to ensure your privacy, but we can change the place if you feel more comfortable so that no one will hear your responses. We appreciate that your time is very valuable and thank you for your help in shaping our knowledge of sustainable process improvement initiatives.

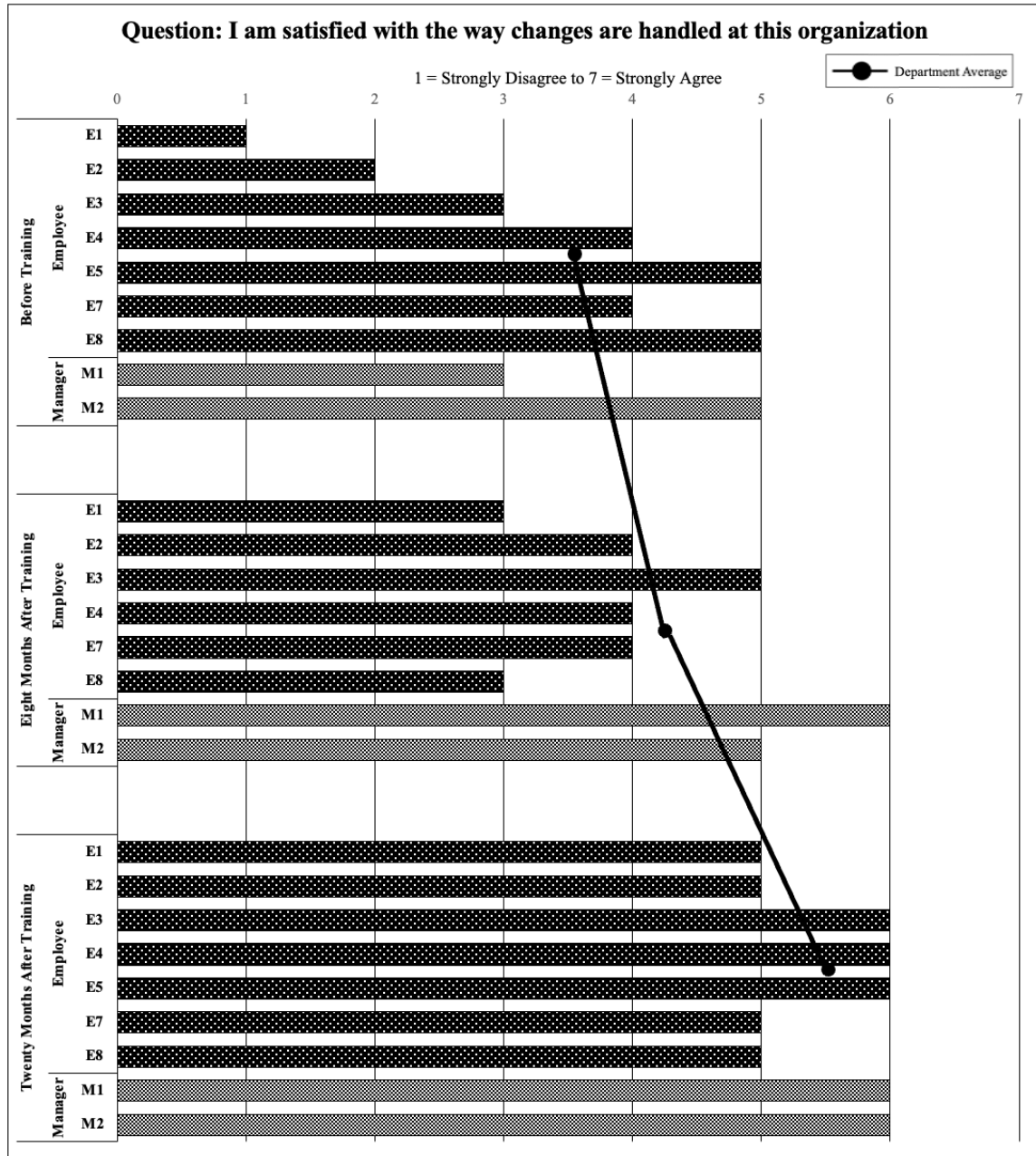
If you have questions about your rights as a research participant, please contact the Institutional Review Board (IRB) at Oregon State University (email: irb@oregonstate.edu or 541.737.8008. After the interview, you can contact me (azharm@oregonstate.edu or 510.556.6304) or Dr. Eseonu (chinweike.eseonu@oregonstate.edu or 541.737.0024) if you have any questions or things to discuss.

Do you have any questions for me before we start?

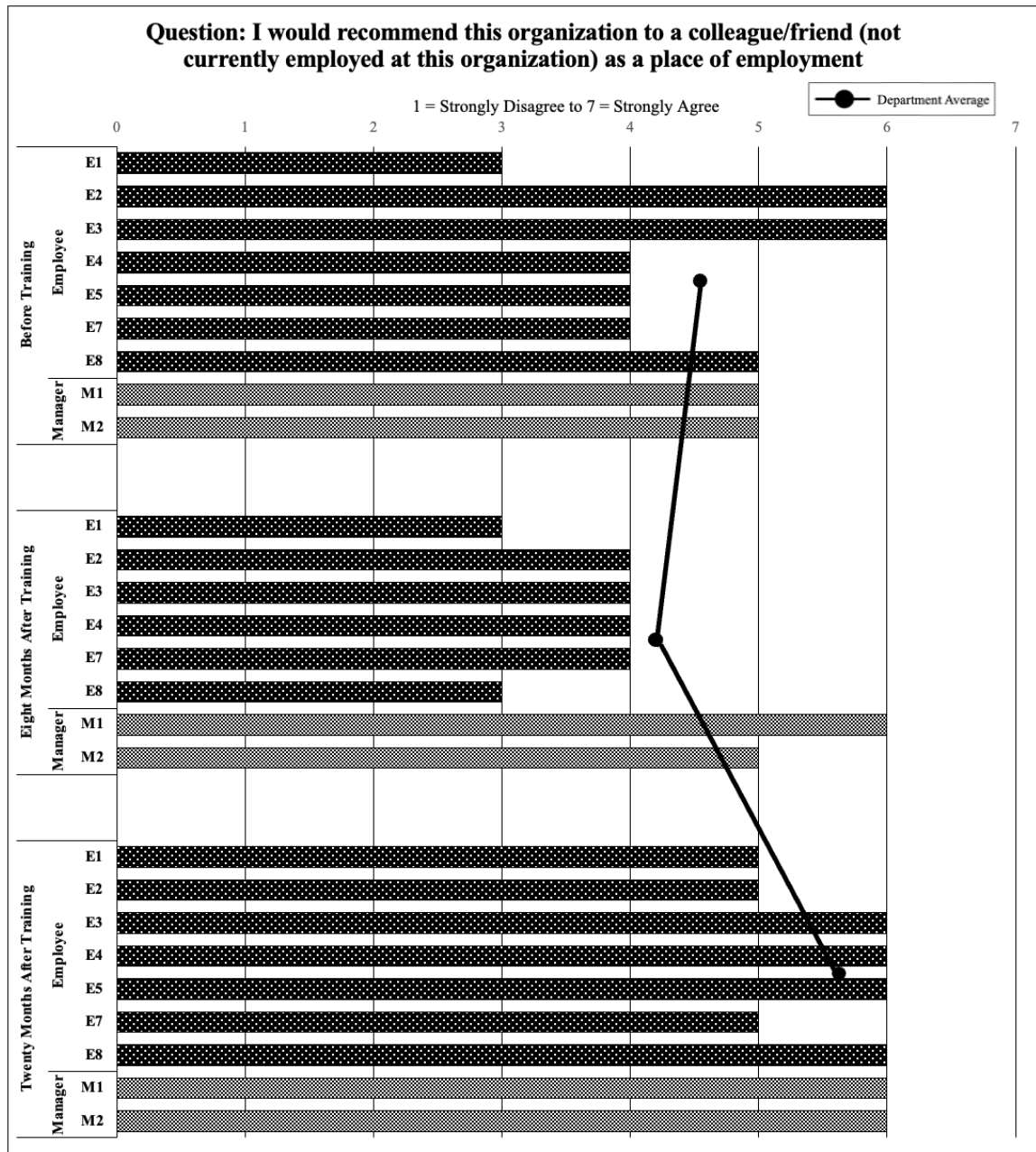
8.3 Appendix 3: Individual Overall Satisfaction with “Problem Resolution”



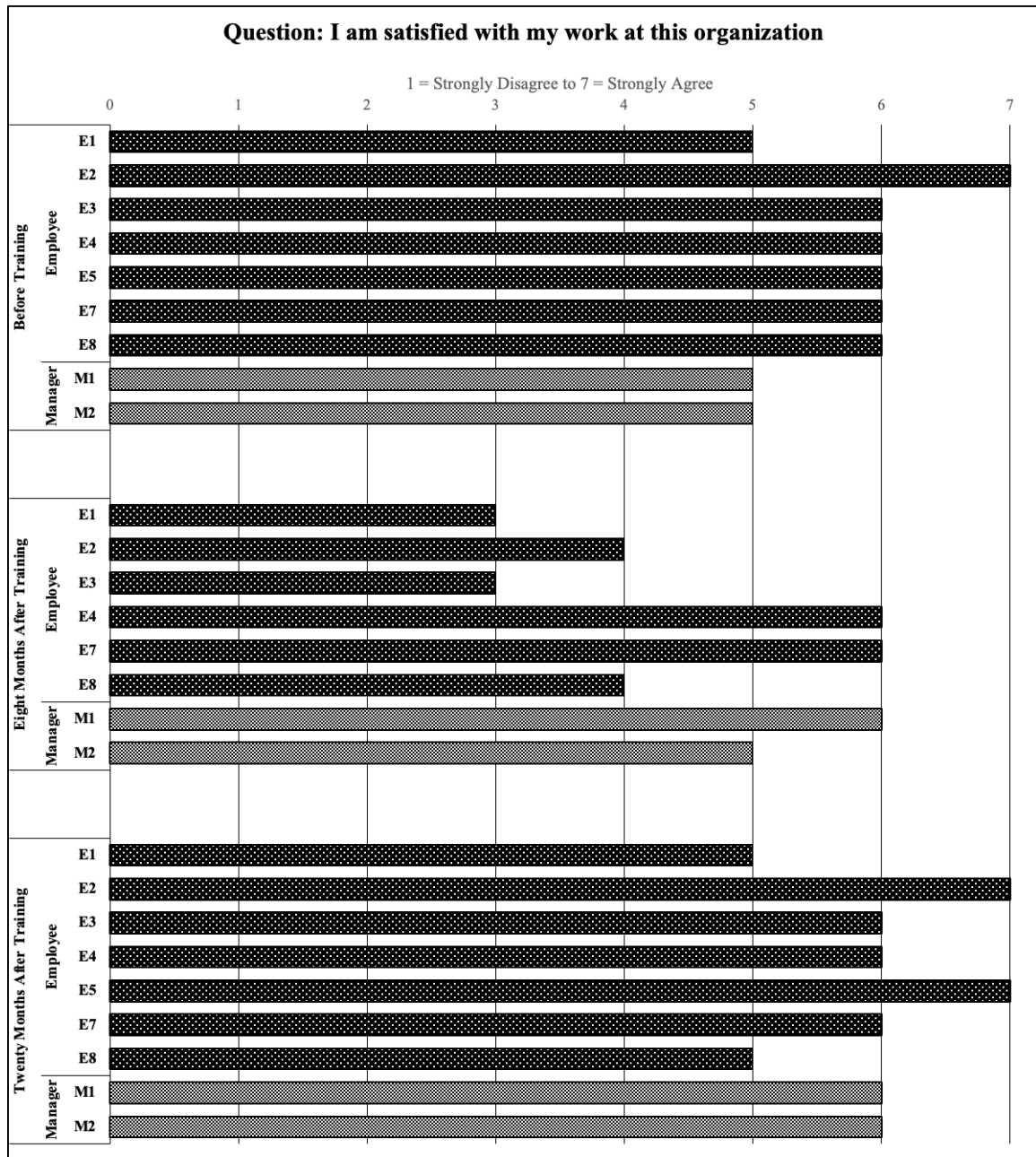
8.4 Appendix 4: Individual Overall Satisfaction with “Change Management”



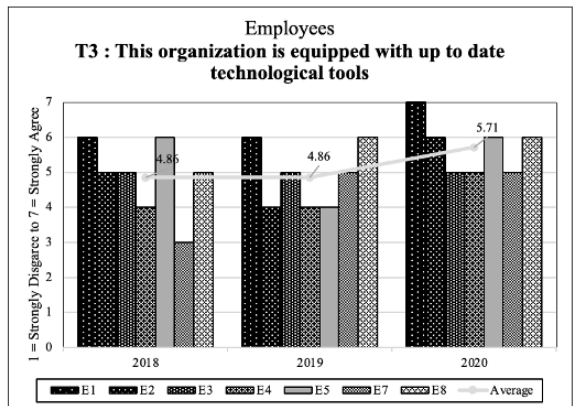
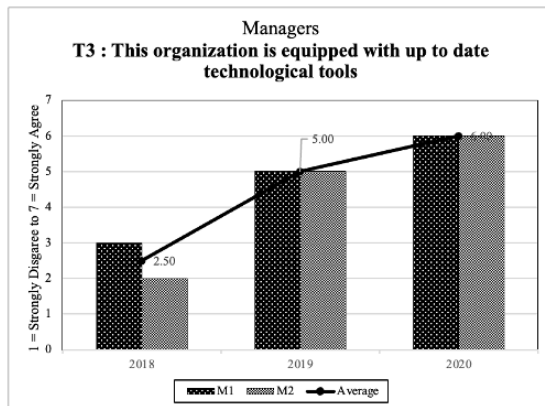
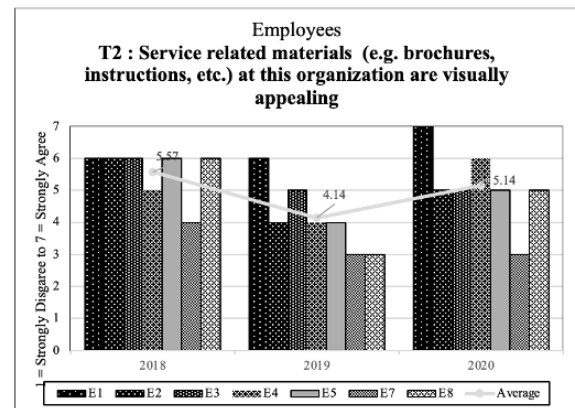
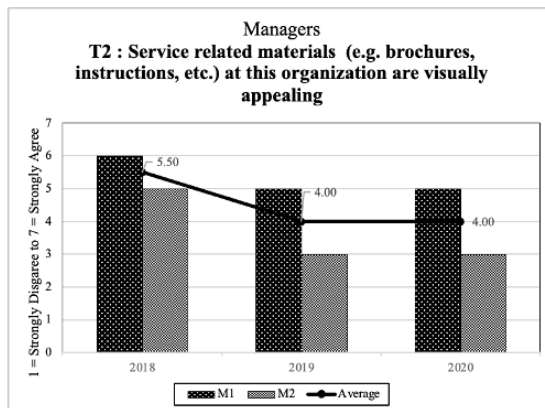
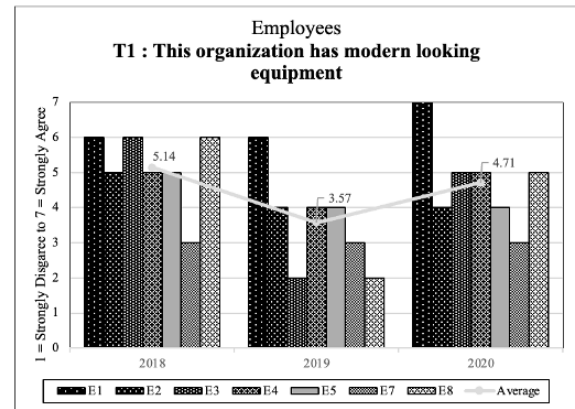
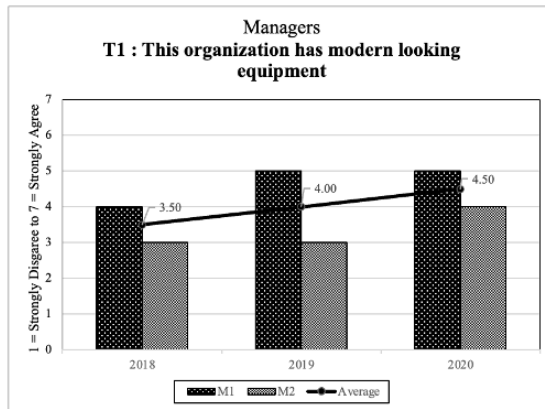
8.5 Appendix 5: Individual Overall Satisfaction with “Net Promoter Score”



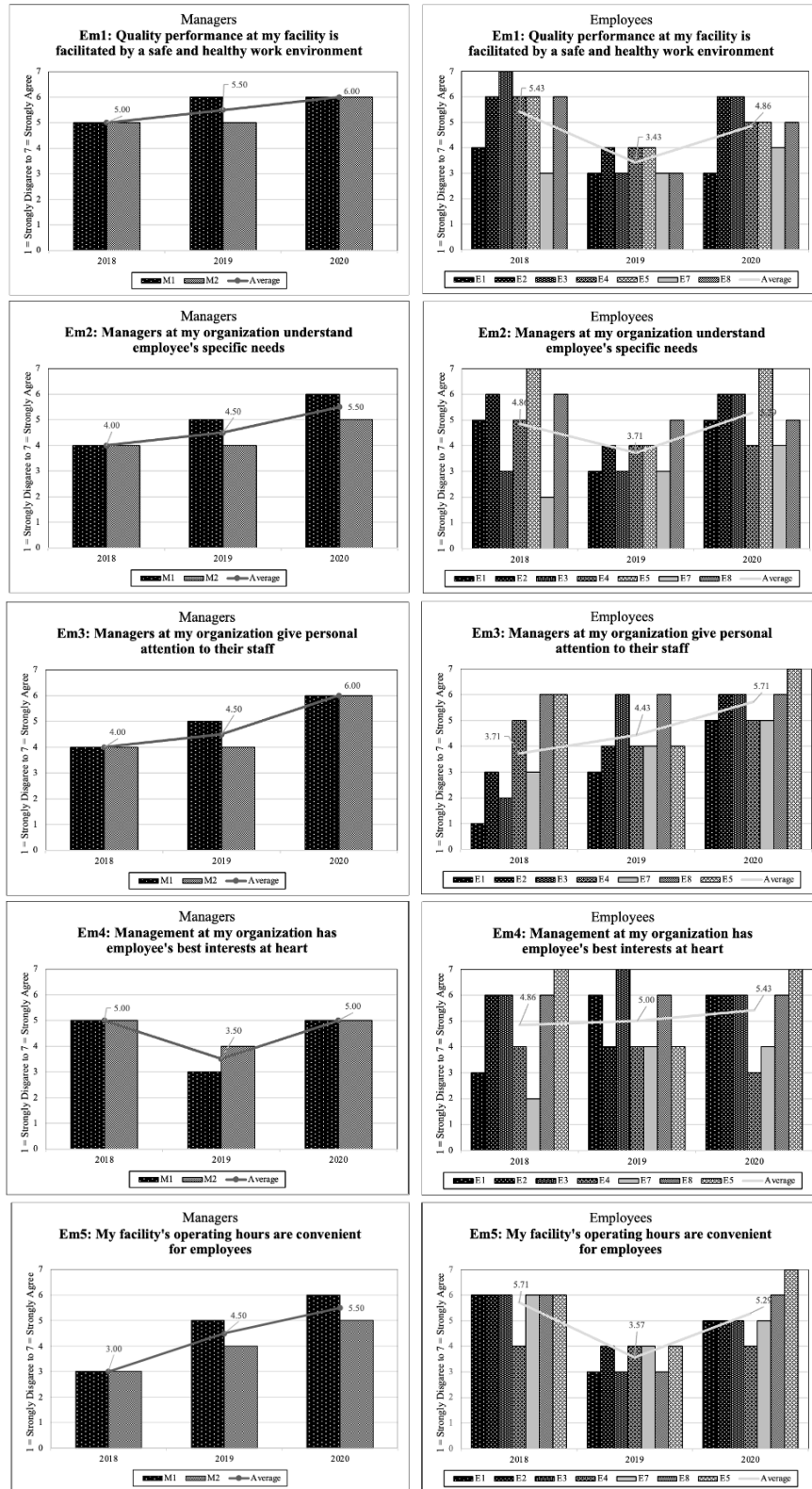
8.6 Appendix 6: Individual Overall Satisfaction with “Work”



8.7 Appendix 7: Individual Satisfaction with Tangibles



8.11 Appendix 11: Individual Satisfaction with Empathy



8.12 Appendix 12: Individual Satisfaction with Change Management (Continued)

