Towards A Lean Innovative Approach to Rethinking Employees Turnover. Surviving with Less-Knowledge, but not Knowledge-less: A Case Study

Osama Al-Baik
Dept. of Comput. & Info. Sci.
Higher Colleges of Technology
oalbaik@hct.ac.ae

Hatem Tamimi
Dept. of Comput. & Info. Sci.
Higher Colleges of Technology
htamimi@hct.ac.ae

Bahae Samhan
Dept. of Accounting & BIS
Illinois State University
bmsamha@ilstu.edu

James Miller
Dept. of Electr. & Comput. Eng.
University of Alberta
jimm@ualberta.ca

Abstract

Regardless of title, authority level, or position in the organization hierarchy, each employee in any firm has unique knowledge that no other employee may possess. What happens when the employees with critical knowledge leave? What are the impacts of losing knowledge because of turnover? How do software development organizations mitigate the risks associated with knowledge loss? High turnover rates are forming a significant problem in the IT industry. Turnover is considered one of the main sources of draining institutional knowledge; hence, this paper seeks to identify the root impacts of the employee departure from the Lean ideal. Over a 3-year real-life case study, the investigators explored and analyzed the implications of turnover in an industrial setting. The emphasis was to re-think the way organizations deal with turnover; The study suggests retaining organization knowledge, rather than retaining staff through utilizing the lean methods to operate with less knowledge, but not knowledge-less!

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1. Introduction

Many Lean methodologies focus on the reduction of wastefulness activities. However, the primary sources of wastes are often ignored. Instead organizations often focus on superficial, easy to describe sources, such as material waste (paper commonly in IT settings), while the large ticket items are regularly ignored.

It is this paper's contention, that for most – IT organizations at least – organizations, the principle waste is staff turnover [6]. This is a complex issue often impacting the entire organization and hence is difficult to transform in a "single stroke of the pen". Staff turnover, of each and every employee, from senior management to acceptance testers have profound impacts on each and every project or product.

Hence, this paper reports on its initial analysis of a long-intuitional study, to explore the impact of turnover in an (example) IT organization.

In every organization, regardless of title, authority level, or position in the organization hierarchy, each employee has unique knowledge that no other employee possesses.

Employees working on the same project or product may have common and general knowledge about the project or the product that they are involved in, however, there will always be pieces of knowledge about a specific subject matter that no other employee will have. Employee turnover is considered one of the main sources of draining institutional knowledge [6].

Loss of institutional knowledge may cause severe damage to the organization; this applies in particular when the loss results from the turnover of the key-resources or senior employees [25, 11]. This is especially true, if it involves experienced employees who have worked for the organization for many years [22].

Research studies reported that, in *Fortune* 500 companies, more than half a million managers leave their positions each year, and for management positions, the average employment duration is 3 years [26]. This high turnover rate means that employees will take all of their tacit knowledge and some of the explicit knowledge they have hoarded – during the tenure of their employment – when they leave.

Therefore, it is a for organizations to cope with the potential departure of their employees [24]. Many organizations spend millions of dollars on developing and purchasing solutions to mitigate the risks associated with knowledge loss [27].

It has been estimated that the cost of hiring and training a replacement worker for a lost employee is approximately 50 percent of the worker's annual salary [28]. In addition, each time an employee leaves the firm; productivity normally drops because of the learning curve involved in understanding the new job [29].

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Despite the technological advancements that facilitate documenting and storing knowledge, organizations still struggle with the fact that knowledge is mainly locked away in the minds of employees [27].

Additionally, this knowledge is rarely shared with other employees before the employee departs [30]. Therefore, senior management is encouraged to mitigate the risks of lost institutional knowledge, create plans for organizations to prevent further loss, protect themselves from knowledge attrition, and sustain previous experiences by codifying knowledge using strategies of knowledge transfer to preserve and retain that knowledge within the organization.

One of the significant gaps present in the literature is that insufficient researches have been conducted on developing practical models that aim at sustaining and retaining knowledge, and when they existed, they lack the "how-to".

Most of the previous research studies have looked at what institutional knowledge to be stored, e.g., Majchrzak et al. [31], why the institutional knowledge gets lost, e.g., Manhart & Thalmann [32], and what methods organizations have used to prevent employees' turnover within specific contexts, e.g., Bryant & Allen [33].

This paper provides an analysis from a case study of an IT department at a software development company that faces a high employee turnover rate. The case study is divided into four phases. Each phase represents a period during which parts of the study were conducted to investigate specific research questions.

We focused on the following research questions: Q1) what are the hidden factors that lead to the loss of knowledge at the organization understudy? Q2) What are the main implications of knowledge loss due to employee turnover? Q3) What are potential remedies to the problems? Q4) How effective are these remedies in addressing the problems of the loss of knowledge due to employees' turnover?

The research investigators have planned to report their findings in two distinct reports. The first report on one hand, aims to investigate Q1 and Q2, which were investigated during the time-periods of Phase I and Phase II. This would shed some lights on the underlying reasons of knowledge loss and its impacts on the organization; The goals are to establish an in-depth knowledge and to develop a comprehensive analysis of the underlying root-causes of the problem, which would ultimately lead to establishing guidelines that inform the implementation protocol.

The second report, on the other hand, will report the findings and results of investigating Q3 and Q4 along with the assessment of the overall performance of the organization under-study.

The results cannot be claimed to be reliable before assessing the impact of the remedies for an extended period of time. Hence, the results of implementing the remedies will be informed in a separate report, and thus are excluded from this study. However, a copy of the undergoing-report is available from authors upon request.

The remainder of the paper is organized as follows; Section 2 provides an overview of the available literature on various topics and subject areas that were examined during the different phases of this research study. Section 3 provides an overview of the research context. Section 4 speaks to the first two phases of this research study, which started with an exploration and data collection phase, followed by a second phase dedicated to analyzing the implications of turnover. Section 5 provides insights to threats of research validity; while, Section 6 provides the conclusions from the study.

2. Literature Review

First, a review started with the available literature on employees' turnover, the impact of turnover on the organization's productivity and efficiency, and what were the proven resolutions to the identified problems resulting from turnover.

Second, a review of the literature on knowledge management was conducted, specifically investigating knowledge transfer and retention.

Third, a review of the available literature on the onboarding of new employees, the importance of successful onboarding, and best practices for smooth and quick onboarding.

There have been pieces of evidence of a growing literature, which mainly investigating the implications of employee turnover on the loss of knowledge [19].

In prior studies, one research stream focused on concepts of knowledge flow between competing firms because of employee turnover [34, 35]; The second research stream focused on the external factors influencing employee turnover such as patterns of wage, tenure, and promotion [19, 36].

Another approach in the literature explains internal factors leading to turnover decisions such as the fit of employees to current jobs or positions [37]. While these efforts are directed towards investigating different parts of employee turnover concepts, they all identified employee turnover as the main contributor to the loss of knowledge and a major threat to the internal knowledge transfer within organizations.

2.1 Employees Turnover

Turnover does not only refer to the employees who leave their current employing organization when the employment relationship ends, but also retired employees, promoted employees, and those who depart on long-term leaves and may not return to work after the leave is over, such as, Long-term Disability or Maternity leave. Research studies reported that the cost of hiring and training a replacement worker for a lost employee is approximately 50 percent of the worker's annual salary [26].

As for the ramifications of employee turnover, it has been reported that it negatively affects organizations' productivity and overall performance by various means, including but are not limited to: disrupting team collaboration [21], reduced employee morale [5], and incurred (high) tangible costs for hiring, training, and mentoring of new hires as well as intangible costs, such as team cohesiveness and team collaboration [4].

Ampoamah and Cudjor [5], reported that reduced quality and the loss of skilled manpower amongst the conveyed negative impacts of employee turnover. Authors often attributed the causes of turnover to employee dissatisfaction resulting from lack of self-esteem, lack of being seen as a valued member in the organization, lack of career development and advancement opportunities, and reporting to a demanding and impersonal supervisor.

Armstrong in [6], argued that underpayment or even the feeling of being underpaid as one of the main reasons for employee turnover. In attempts to resolve the turnover problem, most research emphasized the need to reduce the rate of employees' turnover by dissolving the causes of turnover through recognizing good performance; e.g. [21], investing in training programs, establishing career planning and development programs, and building a trustworthy and mutually respectful work environment [6].

2.2 Knowledge Transfer

The scope of knowledge management is wide, its research topics have been gaining the attention of scholars since the late 1980s. Prior studies have investigated the opportunities, practices, challenges, and benefits of knowledge management.

The available literature reported that organizations across major industries constantly show interest in implementing new knowledge management systems and that managers are becoming aware of the importance of knowledge transfer.

Similarly, the lack of good knowledge management at an organization is found to be contributing directly to the loss of knowledge, especially in situations of employee turnover [24].

Al-Baik and Miller in [1] suggest that organizations willing to capitalize on knowledge must balance their knowledge management activities such as knowledge creation, knowledge validation, knowledge presentation, knowledge distribution, and knowledge application.

In general, to achieve this kind of balance, organizations need to focus on interactions between technology, techniques, and employees to manage its knowledge effectively. By creating a "learning-by-doing" environment, an organization can sustain its competitive advantages [1].

2.3 New-hire Onboarding

Immediately after the recruitment process is completed, organizations should strive to improve the performance and productivity of their new hires through the effective use of onboarding strategies, which has also been referred to as *organizational socialization* [7]

Regardless of what it is called, the main concept is that the quicker the new hires adapt and adjust to the organization's culture, the faster they become productive and contribute towards the accumulated knowledge of the organization.

The maturity level of onboarding programs varies across organizations, for example, one organization may have a one-day "ad-hoc" orientation program, while a different organization may have a formal written onboarding plan that spans over several months. Researchers show that there are two types of onboarding [7]:

1) *Formal onboarding*, which indicates that the organization has recorded policies, procedures, and manuals to help new-hires adapt to both, the organization culture and the work tasks; and
2) *Informal onboarding*, which refers to the activities that new-hires take to learn about the related job duties and/or organization's social and cultural contexts without an explicit or formal organizational plan.

According to research studies [7], new-hires who go through formal onboarding programs that explain the necessary social and cultural norms of the organization, and equip new-hires with the necessary knowledge of how to behave in accordance to the organization's policies and guidelines, adjust faster and become more productive than those who do not attend to a formal onboarding programs.

In fact, Bauer [7] reported that in a study conducted in 1985, it was estimated that 60% of unsuccessful new-hires in managerial positions reported the primary reason of their failure to their inability of establishing effective working relationships. Integrating, adapting, and socializing positive affect performance and satisfaction, and hence reduce the rate of turnover.

Onboarding Practice Guide published by the Society for *Human Resources Management (SHRM)* [7], suggests to build an onboarding program that covers four main criteria; These are:

1) *Self-efficacy*, which refers to building self-confidence with regards to getting the job done "well";

2) *Role clarity*, which refers to introducing the new-hire to the role's duties and responsibilities as well as expectations and other role-related details;

3) *Social integration*, which refers to introducing the new-hire to the social norms of the organization and makes them feel accepted and welcomed by their colleagues; and

4) *Cultural knowledge and fit*, which refers to the level of support provided to the new-hire in order to understand the organization culture, politics, values, and goals.

Motivated by the findings that have been reported in the available literature, this study suggests resolutions to the problem of knowledge loss due to employee turnover using a learn-by-doing lens.

When organizations lose employees due to retirement or because of employee decisions to work for other competing firms, organizations are impacted by the loss of tacit knowledge. Therefore, it becomes really important for organizations to be able to manage knowledge, especially tacit knowledge, to overcome problems of knowledge transfer due to turnover [24].

3. Context of the Case Study

The research's case study is from an internal medium-sized IT department that provides a wide range of IT services through 27 teams, including application hosting, system administration, networking, project management, desk-side support, physical infrastructure and data centers, and software application development.

At the time of writing this manuscript, the IT department had over 400 staff, an estimated annual budget of approximately $60 million, and provided services for 39,000+ end users. The research investigators and the IT department, as an industrial partner, agreed to keep the identity of the organization – which the IT department is part of – anonymous, hence, for the remainder of this manuscript, we will refer to the industrial partner, that is the IT department, by an arbitrary name "ORGUS".

ORGUS has been aiming to reduce their operational costs and service response times, while still increasing quality and customer satisfaction. Process improvement initiatives were deemed necessary to overcome these challenges and to sustain the future performance of ORGUS.

After careful analysis of the organization's capabilities and reviewing the trending improvement methods, ORGUS decided to proceed with implanting Lean Thinking and started with Value Stream Mapping and Waste elimination; for further details, see [1].

The implementation of lean thinking continued with a focus on sustaining the realized improvements that ORGUS has had after implementing waste elimination strategies. The outcome of this research project was an *Integrative Double-Kaizen Loop model* (IDKL), see [3] for more details.

IDKL has proven to be successful within the context of the ORGUS, where continuous learning and sustaining the performance of the improvement initiatives were realized. IDKL and the improvement initiative have transformed the ORGUS' culture into a learning organization and have successfully enhanced the learning habits in the software development teams.

The research investigators have observed a high turnover rate, which was reported to senior management as one of the major problems that ORGUS needed to mitigate and accounted for. Senior management had made a decision to look into the turnover problems as it hit the highest rate of **32.28%** of total employees in ORGUS.

The investigator witnessed key resources (research participants) on the research project leaving ORGUS for various reasons. Hence, this served as an important motivation triggering this research project.

Employee turnover is not just a problem because organizations need to hire new employees; it is also a crucial problem because of the loss of institutional knowledge that accompanies employee turnover. In an attempt to help ORGUS resolving the issues related to turnover, the researchers emphasized the need to re-think the resolution for turnover.

The concept is to attempt retaining organization knowledge, rather than retaining staff. Organizations need the ability to better respond to situations where staff depart from their current positions. Organizations need to adapt to keep operating with less knowledge, but not knowledge-less when employees leave the organization.

During this research study, the research participants were decomposed into core team and supporting team. The core team included a change manager, a project coordinator, two business analysts, four team-leads, and the investigators; the primary investigator was the practice lead, while the co-investigators acted as external consultants. The supporting team was composed of various resources engaged throughout the project as required; it included 278 participants who were involved during the phases of the research project.

4. Phases of The Case Study

In this study, we used mixed methods to investigate the research questions during the four different phases. At the beginning of our investigation, it was important to know what factors that facilitate knowledge transfer between employees were missing from ORGUS. These, factors have a direct influence on the process of knowledge transfer.

Next, we evaluated the impact of losing knowledge due to employees' turnover on ORGUS. This helped us better understand the current situation of the department and the struggles it was going through due to the loss of knowledge based on high employee turnover. After that, we posited possible remedies that may help address this problem. Finally, we applied these remedies and evaluated the improvement in the department's performance because of the implemented remedies.

4.1 Phase I: Exploration and Data Collection

To uncover the missing factors of knowledge transfer between employees that lead to the problem of knowledge loss at ORGUS after employees' turnover, we gathered data from individuals currently employed by ORGUS. We wrote interview questions based on prior studies investigating factors facilitating knowledge transfer within firms [7, 17-18].

The researchers met virtually four times for a total of 10 hours to discuss the suitability and validity of the questions, and any modifications or enhancements that they felt were appropriate before conducting the interviews. This process resulted in several substantive changes to the questionnaire.

The sample consisted of 262 employees of ORGUS. However, 41 were excluded from this study due to their minimum historical knowledge about the situation at ORGUS prior to their placement with the last year. Hence, 221 responses were eventually recorded.

After collecting all of the responses, the data were coded by two researchers. Because the data were independently coded, the inter-rater reliability was assessed. When complete, the coding results were compared for agreement. The analysis of responses revealed a number of knowledge transfer facilitation concepts missing, specifically, *a lack of communication, minimum interaction, and documentation problems*.

Lack of Communication

Respondents were asked to indicate the frequency of their internal communication with their colleagues, and to distinguish between face-to-face communication and other types of contact (fax, phone etc.). In addition, the respondents were asked to specify the purpose behind the face-to-face communication, for example, a coffee meeting for socialization or a work meeting to discuss progress. While we expected to see some differences in patterns between face-to-face and other types of contact, the analysis indicated very little communication took place between the employees.

Our findings show that only 40% of employees met with their colleagues on a regular basis. These meetings were on average once a month, and less than 10% of the time the meeting involved some type of knowledge transfer.

The knowledge transfer process relies heavily on communication, often it involves several months of interaction between stakeholders. This notion is supported by evidence from prior studies, which suggest that higher levels of communication between stakeholders are likely to be associated with high levels of knowledge transfer.

Previous work [13] used the term "absorptive capacity" that refers to the capacity of utilizing new knowledge; they found communication to be a pre-requisite for the development of this capacity. Furthermore, communication between participants in the knowledge transfer process helps in the creation of a supportive environment in which the transfer of knowledge can be easily facilitated [13].

Minimum Interaction

While communication between employees is important for the process of knowledge transfer, there are also varieties of interaction modes that can be used to enhance the process of knowledge transfer. These include technical meetings, extended visits, and joint training programs [7].

In general, it is suggested that the more the interactions, the higher the level of knowledge transfer. Moreover, these interactions should include social components that enhance normative integrations within the organization. In this study, respondents were asked to indicate (1) how often they travelled to technical meetings with other employees from the same department, (2) how often they visited other employees' offices to discuss problems related to the projects they are working on, and (3) how often they received visits from other employees in their offices for similar reasons.

We found that only visits and meetings between employees were reported as an additional means of communication. However, these interactions were very limited, only 7% of respondents reported having meetings that were undertaken to address specific tasks or problems. Because there has been clear evidence of a lack of communication between employees of ORGUS, we identified having a lack of communication and interaction as a potential major contributor to the loss of knowledge after employees permanently departure the organization.

Documentation Problems

It is important to understand that the nature of knowledge can have an impact on the knowledge transfer process. If the knowledge is considered to be tacit, which means it is not readily communicated in written or symbolic form, and then it will be difficult to be transferred.

Bauer in [7], suggests that tacit knowledge can be facilitated by intense interactions between two parties. On the other hand, documented knowledge such as that found in patents and blueprints is likely to be easier to transfer between stakeholders, because it does not rely on a strong social bond between the parties.

Respondents were asked to indicate the extent to which the knowledge in the department was documented, and how easily they can acquire particulars to get the job done by studying a complete set of available "blueprints". Our analysis of the responses shows that the documentation of knowledge at ORGUS was mainly done by individual efforts and only for certain tasks in a project.

This led to having documentation for only small parts of the projects; and in addition, this documentation was in a non-uniformed fashion and scattered between employees who worked on different tasks. Additionally, the documented knowledge in more than 25% of the reported cases was illegible by others. Undocumented knowledge in this case study was behind the loss of more than 45% of the potentially transferable knowledge.

4.2 Phase II: Analyzing Implications of Turnover

After investigating the main contributors to the loss of knowledge, we evaluated the impact of that loss of knowledge on ORGUS. In this phase, we wanted to reveal the consequences of knowledge loss because of turnover. We relied on intensive interviews using open-ended questions. For this phase, we interviewed the majority of the employees at ORGUS as well as a few of their clients. The total number of employees that we interviewed was 279 and the total number of clients was 43. While exploring new emergent core categories, whenever possible, subsequent interviews were initiated with open-ended questions [18].

After collecting data from all 322 respondents, data analysis began with line-by-line coding as recommended by Charmaz [9]. We reviewed the initial codes while reading the transcripts. Codes were then recorded into a spreadsheet and we used constant comparison to generate focused codes. Initial categories were formed from these focused codes which represented expressions made by multiple interviewees.

As responses were coded distinctively by two researchers and cross-checked by a third agent, inter-rater reliability was assessed. When complete, the coding results were compared for agreement. Agreements between investigators have been measured using Cohen's Kappa (k) method to estimate the interrater reliability. The scientifically acceptable level of inter-rater reliability has not been clearly determined by scholars. However, Morell and Fried [16] suggest that for the interpretation of kappa values, "For most purposes, values greater than 0.75 or so may be taken to represent excellent agreement beyond chance".

Therefore, the investigators adopted the rigorous reliability measure of achieving higher than 0.75 on Kappa's scale. The coding scheme was pretested twice and cross-checked once. After the first pre-test, the researchers revised the coding scheme and retested on the same set of data.

This pre-testing approach assured clarity of the revised scheme, as sources of the previous disagreement were spotlighted and resolved. When the second pre-test was conducted, the third and fourth agents cross-checked the tested set of data; as kappa value exceeded 0.75, the coding scheme was considered adequately reliable. Table 1 shows the results of the inter-rater reliability pre-tests.

Table 1. Inter-rater Reliability Estimates

Pretest	**No. of Test Cases**	**IRR**
Pretest 1-1	15	0.52
Pretest 1-2	15	0.70
Pretest 2	20	0.89
Cross-check	20	0.92

We constantly compared new codes to existing categories to refine them and eventually generate emerging categories. We periodically audited each category for cohesion by comparing their codes [18]. The categories basically represent a classification of the responses into groups based upon the subject matter and the core message of each response.

The grouped responses essentially represented trends. Within these trends, the researchers also noticed that there were related categories. The researchers attempted to determine what broader underlying categories were present in the broken-down types of responses, the research participants were invited to group meetings, the categories and discussion led to better understanding and refined categories.

Table 2 includes the refined emerging categories with examples of quotes leading to each category. The responses, as charted in Table 2, were encoded into seven primary categories regarding the implications of knowledge loss from employee turnover.

Table 2. Emerged Categories of Turnover Knowledge Loss Implications

Turnover Knowledge Loss Implications	**Quotes/Examples**
Higher Development Cost	*"We had to pay huge amount of money on overtime"* [Manager] "*The extra cost and time of fixing some bugs were unavoidable*" [Product Manager]
Loss of Expertise	*"Some defects could've been avoided if [xxx] did not leave us in the middle of testing"* [Team Member] *"We were counting on [xxx]'s extensive experience and knowledge of workflow automation to get some forms and workflows developed in a short time. Leaving us before getting these workflows developed put us in unfavorable position with our client"* [Product Manager]
Irritated Client	*"We felt abandoned when [xxx] departed. She was very responsive and getting things done for us"* [Client] *"It was brought to our attention that our existing clients had started to look for alternative solutions"* [Manager]
Reduced Staff Morale	*"[xxx]'s departure broke the team spirit. She always spreader positive energy everywhere she went"* [Team Member] *"When [xxx] left, I had to work double shifts and did not take a single day off for more than 20 days. I would never accept doing this ever again"* [Team Member]
Delay of Service / Product Delivery	"*The extra cost and time of fixing some bugs were unavoidable"* [Product Manager] *"It took two months to develop a simple form that we needed; they promised to have the form ready within three business days for our review"* [Client]
Lower Service / Product Quality	*"We were focusing on getting the product delivered on-time, we did not pay much attention to technical debts"* [Team Member] *"We knew that we would produce more defects as a natural result of new members joining the team in the middle of the project without enough time to familiarize themselves with the code-base"* [Product Manager]
New-hire Onboarding	*"Getting a new-hire to a productive state requires us to spend a tremendous amount of time and effort."* [Product Manager] *"It took me some time to understand the nature of work, every time I ask a question, the typical answer is: Figure it out!"* [new-hire Team Member]

The researchers noted the frequency of interviewees who provided responses that contributed to the development of each code across the various categories. This allowed the researchers to understand better and formulate a set of specific issues related to knowledge loss from employee turnover. The respondents were invited to three more open group meetings, where the identified implications were presented and discussed with the research participants.

As shown in Figure 1, using Pareto Analysis, more than 86% of the research participants reported "higher development cost" as a major implication of turnover, followed by "loss of expertise" as the second-highest reported implication by more than 77% of the research participants, while the third-highest reported implication was "Onboarding of New-hire" as indicated by more than 74% of the research participants.

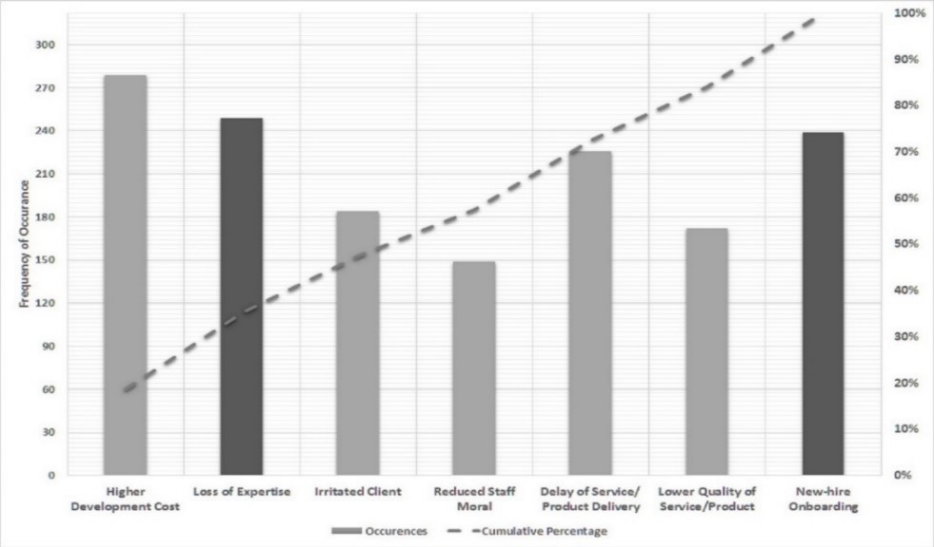

Figure 1 – Pareto Analysis of Categories

The less frequent responses were "reduced staff morale" as reported by slightly over 46% of the participants, "lower quality of service" by just over 53%, "irritated client" by 57%, and "delay of service delivery" by slightly over 71% of research participants.

Likewise, the core existence for each of these categories: "Higher Development Cost", "Delay of Service/Product Delivery", and "Lower Quality of Service/Product" was in fact influenced by the other remaining two categories, those were, "Loss of Expertise" and "New-hire Onboarding.

As portrayed in Figure. 2, the relationships between the seven categories are presented, and the identified major two categories have been presented in dark-grey boxes. Our analysis of research participants' responses highlighted the possibility of having "New-hire Onboarding" and "Loss of Expertise" as the main sources of the other implications of knowledge loss from employees' turnover.

The existence of problem-impact categories: higher development costs, irritated clients, reduced staff morale, delay of service/product delivery, and lower quality of service/product were not only found to be influenced by the loss of knowledge and new-hire onboarding, but they were also influencing the existence of each other.

As an example of such evidence, consider this quote from a product manager: "The extra cost and time of fixing some bugs were unavoidable". This statement shows the influential impact on core existence between "higher development cost", "delay of product delivery", and "lower quality of product".

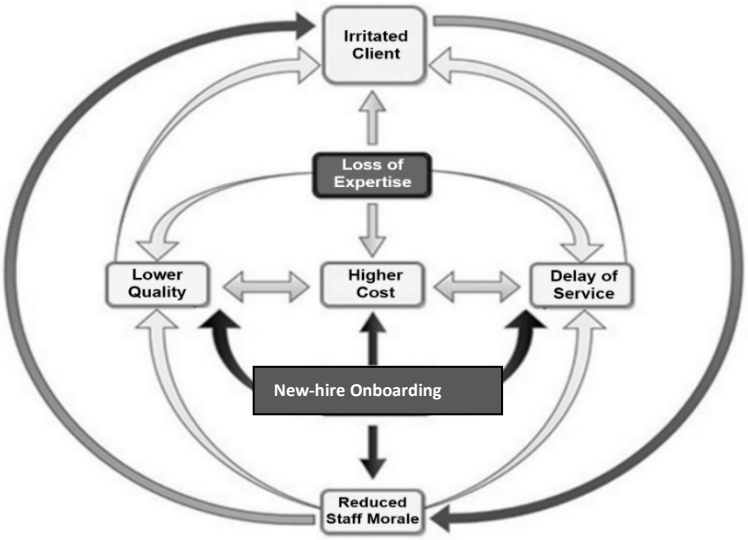

Figure 2– Analysis of Relationships between Categories

The discussions of the implications with the research participants and their inputs and feedback did not only help in narrowing down the categories related to employee turnover, but also was a forum to discuss how to use these implications to derive remedies and strategies that would articulate "how-to" create a system that sustains and continuously retains knowledge.

The researchers theorized two main mechanisms to address the major problem areas. The first theorized-resolution was suggested to deal with "New-hire Onboarding" by developing practical onboarding strategies, and the second conceived-resolution was to deal with "Loss of expertise" by developing practical Knowledge Sharing Strategies that retain knowledge within the organization.

Assessing and evaluating the results of implementing these remedies are outside the scope of this study and will be provided in a separate publication. (an undergoing-report is available from authors upon request.)

5. Threats to Validity

This study has its limitations. We could not discount the impact of confounding and local variables in having a significant impact on the reported results, such as the successful implementation of other improvement initiatives and the development and implementation of the other learning models, such as IDKL (Al-Baik & Miller, 2017), which is considered a threat to *internal validity.*

The study summarizes 3 years of work in one organization and is specific to its culture, practices, policies and employees (study participants). Therefore, the case study findings are difficult to generalize to other similar settings or different industries [8]; The context of each organization per se might dramatically impact the results of similar undertakings. This constitutes a threat to *external validity*. We encourage future researchers to conduct investigations in different settings to determine levels of finding generalizability.

An overall challenge experienced when undertaking this research study was the definition of the scope, as the area under study is multidisciplinary and covers a broad range of fields. Searches for available literature that IT organizations can benefit from, would be challenging and complex, as terminology may refer to a different notion in different industries; this comprises a threat to *construct validity*.

In addition, the study is focused on knowledge loss due to employee turnover only while overlooking other sources of knowledge loss such as the loss of structural capital [15].

6. Conclusions

Waste elimination or reduction is a key idea in Lean methodologies. Toyota, the ultimate source of all things Lean, has policies which can be interpreted as supporting the idea of a "position for life"! Clearly, a direct implementation of this approach in the North American IT market is highly problematic, and hence, alternatives need to be explored.

High turnover rates are a significant problem in the IT industry; hence, this paper seeks to identify the root impacts of this departure from the Lean ideal. The case study approach allowed the investigators to conduct an intensive analysis of the situation for a reasonably long period. This does not only allow the researchers to define the problem, analyze the causes, and develop remedies strategies, but it also allows the implementation of the remedies, and evaluates whether improvements have been realized.

While many researchers have studied employee turnover and knowledge transfer distinctively, few have considered investigating predictors and impacts of knowledge loss from employees' turnover. Further, there are limited efforts towards providing specific practices that can mitigate the problems stemming from the loss of knowledge due to employee turnover in knowledge-based organizations in general, and in IT and Software organizations in particular.

While additional research is needed to generalize our findings across organizations and industries, the current study does show the importance of understanding predictors, implications, and potential remedies of knowledge loss due to employee turnover. The case study provided important findings throughout the different phases of the research. These findings are expected to help practitioners by providing them with precautious measures that can be taken to reduce the impact of knowledge loss when employees leave the organization.

It is the recommendation of this research for managers to encourage team collaborations, increase the frequency of technical meetings, and assure the legibility of documenting knowledge at their organizations. This case shows that strong relationships and connections between the individual employees involved as well as the documentation of knowledge are also critical to successful knowledge transfer.

Additionally, the undergoing after-the-effect remedies may be beneficial to organizations that are experiencing similar problems of knowledge loss due to employee turnover.

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