

Employee Turnover Intention in Indonesian Organizations: The Role of Job Satisfaction (A System Dynamics and Latent Dirichlet Allocation (LDA) Study)

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Received: 25th January 2025/ Revised: 1st July 2025/ Accepted: 2nd July 2025

How to Cite: William, M. M., & Sundiman, D. (2025). Employee turnover intention in Indonesian organizations: The role of job satisfaction (A system dynamics and Latent Dirichlet Allocation (LDA) study). *Binus Business Review*, 16(2), 207–222. <https://doi.org/10.21512/bbr.v16i2.12972>

ABSTRACT

The research investigated employee turnover intention, a critical challenge for organizations, especially in Indonesia. The researchers focused on T and U Organizations, exploring the mediating role of job satisfaction. The descriptive data were gathered from ten informants, adopting a qualitative approach. Latent Dirichlet Allocation (LDA) was used to identify keywords from interviews, integrating these insights into a system dynamics model to simulate policies for improving employee retention. This unique NLP-driven integration offered a novel contribution. System dynamics methodology was extensively utilized to unravel complex, dynamic, and interdependent relationships within the system, offering a powerful approach to understanding intricate dynamics. Model simulations reveal a significant relationship. Increased job satisfaction effectively stabilizes turnover intentions. Key factors influencing job satisfaction include work environment, compensation, and job stress. Qualitative analysis also uncovers emergent factors, such as gender inequality in compensation and leader character, as crucial determinants. The research provides a valuable framework for understanding the intricate interplay between turnover intention and job satisfaction by offering practical insights for organizations and guiding future academic endeavors in the dynamic field of human resource management. The research also offers a robust and valuable tool for decision-makers to evaluate targeted policies aimed at enhancing job satisfaction and reducing turnover.

Keywords: turnover intentions, job satisfaction, system dynamics, Latent Dirichlet Allocation (LDA)

INTRODUCTION

The surge in employee resignations, as reported by Detik, with 4.4 million individuals in the United States alone leaving their positions in 2021, underscores a critical issue regarding the adequacy of compensation (Laucereno, 2021). This mass exodus is largely attributed to the provision of salaries deemed infeasible by the workforce, highlighting a significant disconnect between employer offerings and employee expectations. Nick Bunker, the Director of Research at Hiring Lab, further elucidates this phenomenon by emphasizing that resignations are most common in immediate or relatively low-paying jobs, indicating

a disproportionate impact on those in entry-level or lower-wage positions (Bunker, 2021). This trend not only reflects a growing dissatisfaction with financial remuneration but also points to broader issues within the labor market, such as the rising cost of living and shifting priorities among workers. The implications of these resignations extend beyond individual employees, affecting organizational stability and productivity, and necessitate a reevaluation of compensation strategies by employers to retain valuable talent. Moreover, this widespread trend signals a potential shift in the power dynamic between employers and employees, as workers become more assertive in demanding fair and competitive wages.

As per Jobstreet, 50% of employees who work from home choose to resign due to the increasing number of jobs and longer working hours, leading to extreme fatigue that triggers 'The Great Resignation' (Ulva, 2022). According to a survey conducted by Michael Page Indonesia in 2022, 84% of Indonesian employees intended to leave their company within the next six months (Riches, 2022). According to a survey by Deloitte (2023) and Nurrahman (2022), millennial and Gen Z employees will resign massively due to burnout or chronic stress, with as many as 46% of Gen Z and 45% of millennials experiencing fatigue in the work environment.

Human resources are one of the keys to the success of a company in any industry, so the need to retain employees is very important in the challenges and competition of the industry. Globalization that moves dynamically requires companies to always do their best in competing to survive in the market. A limited workforce limits business growth and burdens existing staff with extra responsibilities, which will lead to job stress (Nestor-Harper, n.d.).

Human Resources Management (HRM) is considered a strategic and valuable asset to be developed in an organization (Ongkowijoyo, 2021; Rahman, 2019). This is because available systems and equipment cannot operate without human presence. Humans are the core of all systems in a company, so they must be the main concern before carrying out business processes (Dahiya & Raghuvanshi, 2022; Ongkowijoyo, 2021; Rajput et al., 2023). Managing human resources becomes increasingly complex due to changes in the demographic profile of the workforce, the impact of external and internal forces on the business environment, and the emergence of the virtual economy (Ashraf, 2020).

Job satisfaction is a pleasant or unpleasant emotional state that employees experience about their work. Not only that, but job satisfaction also reflects people's feelings towards their work. One's job satisfaction affects absenteeism, labor turnover, and other important issues (Medina, 2012; Taheri et al., 2020). Job satisfaction makes employees consider leaving their current jobs and thinking about moving to another job (Alias et al., 2018). Job satisfaction focuses on individual responses to work or specific aspects of work such as payment, supervision, and working conditions (Ashraf, 2020).

Job satisfaction has been a crucial factor influencing employee turnover decisions for many years. It is widely recognized that employees who are satisfied with their jobs are more likely to stay with their organizations. This satisfaction can stem from various factors such as job demands, decision latitude, and mental strain (Zimmerman & Darnold, 2009). Furthermore, leadership styles can also influence job satisfaction and, consequently, employee motivation (Aruldoss et al., 2022). Therefore, enhancing job satisfaction has been a focus for organizations aiming to retain talent and reduce turnover rates. This emphasis on job satisfaction underscores its enduring

importance in organizational behavior and human resource management (Budhiraja & Rathi, 2023; Kalia et al., 2024; Taheri, 2021).

The work environment is also an important part of the HRM process. According to Aruldoss et al. (2022) and Laraswani and Lubis (2020), a good work environment is characterized by its facilities and infrastructure, where the relationship between employees and corporate culture significantly influences employee performance. A good work environment will motivate employees to work more optimally because they feel comfortable and are supported by the company. This comfortable feeling can reduce the stress and boredom experienced by employees at work. In achieving the performance and goals targeted by the company, a conducive work environment is considered very important for the company to pay attention to. Hence, employee performance reaches the optimal point as expected by the company.

The work environment is also a factor in turnover intention and retention. A positive work environment (growth/learning environment) will reduce turnover intention and vice versa. Whereas according to Blomme et al. (2010), work-family conflicts play a major role in increasing employee stress. When the intensity of the conflict increases, the feeling of wanting to leave the company also increases.

According to Taheri (2021), employees are contributors to the success of an organization, so providing a proper work environment is mandatory. A constructive work environment ensures perfect results. When a conducive and constructive work environment is created, it prevents employees from situations that hinder their productivity and optimizes their potential.

Job satisfaction cannot be separated from compensation. Compensation is something that must be received by employees and becomes a major factor that will encourage someone to be motivated to carry out their duties properly. However, compensation discrimination is commonplace due to the numerous factors considered when determining an employee's basic salary. As a result, many employees seek better job opportunities because they are dissatisfied with the compensation or salary they receive (Asih, 2021; Lee & Sabharwal, 2016).

Compensation is one of the many important factors that receive attention in many organizations in maintaining and attracting quality human resources (Bangun, 2018; Rahman, 2019). Compensation is the entire remuneration received by employees as a result of carrying out work in the organization in the form of money or otherwise, which can be in the form of salaries, wages, bonuses, incentives, and other benefits, such as health benefits, holiday allowances, meal allowances, leave allowances, and others (Ashraf, 2020; Hariandja, 2002). By implementing an incentive payment plan, the company's profitability will likely increase, and employees will feel more motivated (Ashraf, 2020; Laraswani & Lubis, 2020).

According to Asih (2021), compensation plays

a fairly important role in smoothing the operation of the company, respecting employee achievements, and ensuring fair employee salaries. Compensation is the company's obligation as a reciprocal of employee performance. Meanwhile, from an organizational perspective, according to Bayo-Moriones et al. (2021), Kim and Jang (2020), and Lin et al. (2021), compensation is a factor that must be considered and calculated wisely based on employee motivation and the financial and business conditions of the organization.

Next, job stress is a problem in modern life and is common among companies. Individually, job stress not only leads to decreased productivity but also impacts staff commitment to the organization. Job stress also impacts company performance, such as company output and employee turnover rates (Falahat et al., 2019).

According to Alias et al. (2018), employers are now very serious about addressing stress management issues that can affect employee dissatisfaction and, consequently, lead to higher turnover intentions. The reason stems from uncertainty about the roles employees need to perform. This problem may stem from employees' misunderstanding of what is expected of them, how to meet the same expectations, and employees' thoughts about work.

In this study, researchers employ system dynamics, a powerful tool designed to unravel the complex and dynamic relationships inherent within multifaceted systems (Alefari et al., 2020; Sterman, 2000). System dynamics operates on the fundamental principle that every system, regardless of its domain, is characterized by intricate interdependencies. Each component within such a system maintains a highly dynamic relationship with other components, fostering a web of interconnectedness that extends throughout the entire structure. This interconnectedness gives rise to the very real possibility of causal relationships occurring between various components, where changes in one element can propagate and influence others, often in non-linear and unexpected ways. The researchers choose this method due to its unique ability to capture feedback loops, time delays, and non-linearities, all of which are critical for understanding and modeling the behavior of complex systems over time (Atkinson et al., 2018; Felmingham et al., 2023; Schoenenberger et al., 2021). System dynamics enables the creation of simulation models to test scenarios and policies, revealing long-term consequences that linear models miss. By visualizing causal loops and Stock and Flow models, researchers gain a holistic understanding of system behavior, identifying leverage points for effective solutions. This approach allows predictive analysis of system responses, aiding proactive decision-making and providing a valuable framework for managing complex systems. Many previous studies have proven this approach (Berenjkar et al., 2021; Martínez-Valderrama & Ibáñez, 2023; Sundiman, 2021).

System dynamics model provides advantages

not only in describing system structure and resulting behavior but also in evaluating several possible (plausible) future scenarios. System dynamics makes it possible to include changes in assumptions so that it can provide a better understanding for decision-makers in making decisions with long-term impacts (Hidayatno et al., 2017). Regardless of how strong the system dynamics is, it is necessary to define system boundaries and formulate hypotheses to build a system dynamics model (Alefari et al., 2020). The system dynamics method reached its half-century mark in 2007. Many problems investigated by previous researchers in the field can be examined using the basis of system dynamics models (Andersen et al., 2020).

System and business dynamics methods are based on feedback systems borrowed from control theory. They can easily handle non-linearity, time delay, and multi-loop structures of complex and dynamic systems. These methods provide a foundation for building models in computers to do what the human mind cannot. They rationally analyze the structures, interactions, and modes of behavior of complex social systems, thereby providing a framework within which strategies can be tested. Simulations can be carried out while options are still open (Bala et al., 2017).

System dynamics is an approach to understanding problems and solutions. It captures the complexity of real-world problems through explanations of feedback between endogenous variables (Andersen et al., 2020). Through formal and informal modeling, system dynamics-based analysis clarifies and opens up these feedback structures for discussion, debate, and consensus-building, necessary for successful public-sector policymaking. According to Satyani et al. (2021), system dynamics modeling is a method with system thinking. It is a tool to understand complex management problems and support business process development or reengineering better. In detail, system dynamics modeling is adopted to map the structure of the system to understand and communicate an understanding of the behavior-triggering processes and quantification of the relationships. It generates a series of equations in the initial step of simulating the possible behavior of the system over time (Satyani et al., 2021).

According to Tarurhor and Olatunji (2022), a healthy business environment is a dynamic business environment and has made the concept of dynamism the core area of business literature for quite a long time. From various literature studies on business dynamics, businesses that compete in creating new industries revive old ones (survival) and discard inefficient practices, so that companies that are unable to compete and survive will leave the market. Then, new companies will enter the market (entry, exit, growth, survival). Business dynamics is introduced by economist Joseph Schumpeter as a company entry and exit phenomenon. Besides that, business dynamics is also described as a mechanism whereby outdated ideas, industry, or company practices are replaced by new and potentially revolutionary ones.

As the digital era is dynamic and constantly changing, business models also need to change, improve, and require high processing speed and fast follow-up. Increasingly complex business dynamics demand the establishment of a more comprehensive business model to accommodate every business process required within an organization. Model improvements that are continually carried out will certainly contribute to minimizing the complexity of business processes. With model revitalization, a business is targeted to continue to reach one level better than the previous one (Satyani et al., 2021).

Literature consistently identifies job satisfaction as a crucial factor influencing employee turnover decisions, with satisfied employees more likely to remain with their organizations (Nestor-Harper, n.d.; Zimmerman & Darnold, 2009). This satisfaction is often linked to factors such as work environment, compensation, and job stress. While traditional models explore these relationships, a more nuanced and holistic understanding of the complex dynamics influencing employee retention remains necessary, especially in specific organizational contexts. Existing research often overlooks the integration of emergent, context-specific factors that significantly impact job satisfaction and turnover, as well as the dynamic feedback loops inherent in these systems (Asih, 2021; Lee & Sabharwal, 2016).

The intention to move is defined as an employee's transfer from one company to another (Falahat et al., 2019). This issue is important for many companies. Employee turnover consists of voluntary turnover (resignation, quitting, or retirement) and involuntary turnover (termination, dismissal, layoff, or death) (Li et al., 2021). For organizations, a high voluntary turnover rate has more disadvantages than advantages. The first negative effect of turnover is the potential for high costs associated with replacing employees. The costs associated with recruiting, selecting, and training new employees are consistently high, so organizations strive to increase the commitment of their skilled employees and enhance their retention rates. The second negative impact is the disruption of organizational functions, such as decreased performance and unfulfilled daily functions (Li et al., 2021).

The research addresses this gap by uniquely leveraging Natural Language Processing (NLP) with Latent Dirichlet Allocation (LDA) to analyze qualitative interview data, which uncovers and prioritizes specific concerns and drivers of job satisfaction and turnover intentions as expressed by employees. These NLP-driven insights, including newly identified emergent factors, such as gender inequality in compensation and leader character, are then directly integrated into the construction and simulation of a system dynamics model. This innovative methodological approach allows for a comprehensive understanding of complex interdependencies and the evaluation of policy impacts over time.

The research novelty stems from its approach to understanding employee turnover intention by focusing on the specific context of T and U Organizations in Indonesia and incorporating emergent factors, such as gender inequality in compensation and leader character, into a system dynamics model of job satisfaction. Unlike previous studies that may focus solely on traditional factors such as work environment, compensation, and job stress, this research uniquely leverages NLP with LDA to analyze qualitative interview data. This NLP analysis helps to uncover and prioritize the specific concerns and drivers of job satisfaction and turnover intentions as expressed by employees within these organizational settings. By then integrating these context-specific, NLP-driven insights, including the identified emergent factors (direct construction and simulation of a system dynamics model), the researchers offer a more nuanced and holistic understanding of the complex dynamics influencing employee retention within these Indonesian organizations. The resulting model provides a novel and valuable tool for assessing the potential long-term effects of targeted policies aimed at enhancing job satisfaction and reducing turnover in this specific context, by addressing the most relevant factors to employees themselves.

Drawing from the established conceptual framework and the detailed analysis of prior studies, the researchers present research propositions. First, positive work environments decrease turnover intentions by fostering growth, comfort, and productivity (Laraswani & Lubis, 2020; Taheri et al., 2020). Employee discomfort may drive them to leave, while safety and adequate facilities reduce turnover intentions. Inadequacies increase employee discomfort (Laraswani & Lubis, 2020). Second, job stress, arising from task uncertainty and misaligned expectations, increases turnover intentions. It not only reduces productivity but also affects employee commitment, lowers organizational performance, and raises turnover intentions (Alias et al., 2018; Falahat et al., 2019). Third, compensation affects employee turnover intentions. Compensation is a crucial factor in retaining and attracting quality human resources (Bangun, 2018). It boosts employee motivation, but wise consideration based on the organization's finances is essential in compensation practices (Kim & Jang, 2020). Fair and equitable compensation reduces turnover intentions, whereas unfair compensation has the opposite effect (Laraswani & Lubis, 2020). Fourth, job satisfaction impacts turnover intentions as it involves an individual's response to various work aspects. It influences absenteeism, turnover, overall satisfaction, and other critical issues (Ashraf, 2020; Medina, 2012). Job satisfaction prompts employees to consider leaving their current roles for other positions (Alias et al., 2018). From the process of formulating propositions outlined, the Causal Loop diagram model constructed using Vensim 9.3.3 can be seen in Figure 1.

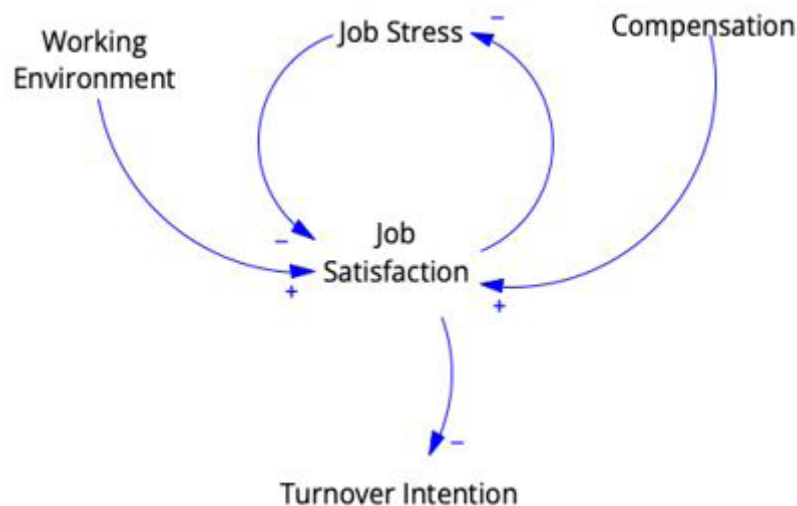


Figure 1 Causal Loop Diagram Model for Turnover Intention

METHODS

The research aims to examine the influence of work environment, job stress, and compensation mediated by job satisfaction on turnover using system dynamics. The research focuses on employees working in T and U Organizations. The research adopts a comprehensive qualitative research approach, strategically chosen for its ability to obtain more in-depth and diverse information regarding job satisfaction, turnover intention, and related influencing factors within T and U Organizations.

To thoroughly understand the complex dynamics within this system, the researchers utilize the system dynamics method extensively. This approach is particularly powerful due to its unique capability to unravel complex and dynamic relationships inherent within multifaceted systems, which are characterized by intricate interdependencies. The system dynamics method enables researchers to capture feedback loops, time delays, and non-linearities, all of which are critical for understanding and modeling the behavior of complex systems over time.

By visualizing Causal Loops and Stock and Flow models, the system dynamics method provides a holistic understanding of system behavior, facilitating the identification of leverage points for effective solutions, and supporting predictive analysis of system responses to aid proactive decision-making. Furthermore, the system dynamics method excels not only in describing system structure and resulting behavior but also in evaluating multiple plausible future scenarios, offering decision-makers a clearer understanding of choices with long-term impacts. This methodology has been widely supported for its utility in managing complex systems (Berenjkar et al., 2021).

The innovation of the research is further strengthened by the integration of NLP using LDA

for the analysis of qualitative data collected from interviews with ten informants. The application of NLP with LDA is crucial in identifying keywords and prioritizing specific concerns and drivers of job satisfaction and turnover intention as directly expressed by employees. This method is particularly instrumental in uncovering emergent factors that may be overlooked by traditional research approaches, such as gender inequality in compensation and leader character (Memon & Satpathy, 2020).

By integrating these NLP-driven, context-specific insights directly into the construction and simulation of the system dynamics model, the researchers offer a more nuanced and holistic understanding of the complex dynamics influencing employee retention. This interdisciplinary approach offers a novel and valuable tool for evaluating the potential long-term effects of targeted policies designed to enhance job satisfaction and reduce turnover, particularly by addressing the factors most relevant to employees themselves. The analytical process involves keyword identification using NLP-LDA in Google Colab, followed by the development of the system dynamics model using Vensim PLE 9.3.3 for policy simulation.

Regarding limitations, the use of qualitative NLP-LDA with a small sample size of ten informants (five per organization) presents certain considerations. While qualitative methods prioritize depth of information, this sample size, particularly when combined with an NLP technique like LDA, which typically benefits from larger text corpora for more robust statistical topic identification, can limit the generalizability of the findings to other organizations or broader populations. The identified emergent factors, such as gender inequality in compensation and leader character, are specific insights from these informants. While significant within this context, their prevalence

across other organizational settings requires further investigation with a larger and more diverse sample. The research offers an in-depth, context-specific understanding. However, the transferability of its findings should be interpreted with consideration for the scope of the sample.

RESULTS AND DISCUSSION

Based on the data from the interviews, the researchers present an analysis of the research data. Analysis of job satisfaction reveals that other variables emerge during the data collection process, in addition to the variables being studied. Presentation of other variable findings regarding job satisfaction on switching intentions can be seen in Table 1 (see Appendix).

Based on a detailed analysis of interview data and tabulations, reinforced by keyword identification (topic modeling) using LDA, the research comprehensively identifies several pivotal factors that influence employee job satisfaction and, consequently, turnover intention. The LDA results clearly indicate that compensation, work environment, and leadership play a crucial role in job satisfaction, which, in turn, enhances employee retention. Compensation (salary) emerges as a primary benchmark for job satisfaction (Taheri et al., 2020).

An appropriate salary commensurate with responsibilities creates satisfaction, while a perceived inadequacy reduces satisfaction and triggers the intention to leave the organization. Mr. D's statement specifically highlights the absence of salary adjustments

based on performance or achievements as a key motivator for employees to seek better opportunities elsewhere. Furthermore, the work environment is also found to significantly impact employee satisfaction, encompassing aspects such as communication, work culture, facilities, colleagues, working relationships, and working conditions. Mrs. L emphasizes the critical importance of a suitable work environment, stating that a conducive environment can reduce stress and boredom, motivating employees to work optimally and thereby reducing turnover intention, even over a high salary.

Crucially, through the rigorous NLP with LDA analysis of the qualitative interview data, the research successfully uncovers emergent factors that significantly influence job satisfaction, extending beyond the traditional variables initially considered. Two salient findings from these emergent factors are gender inequality in compensation and leader character. Mrs. A explicitly reveals injustice in the pay system where male employees receive higher earnings than female employees at the same level, despite similar work and responsibilities. This finding supports the broader understanding that gender discrimination in the workplace is a common worldwide phenomenon, where women are often paid less than their male counterparts even with similar qualifications (Catalyst, n.d.). Regarding leader character, informants from T and U Organizations underscore how leaders who trust in employee improvisation, delegate tasks to develop potential beyond usual abilities, possess and share vast knowledge, and foster a less tense work atmosphere. Substantially, those factors contribute to

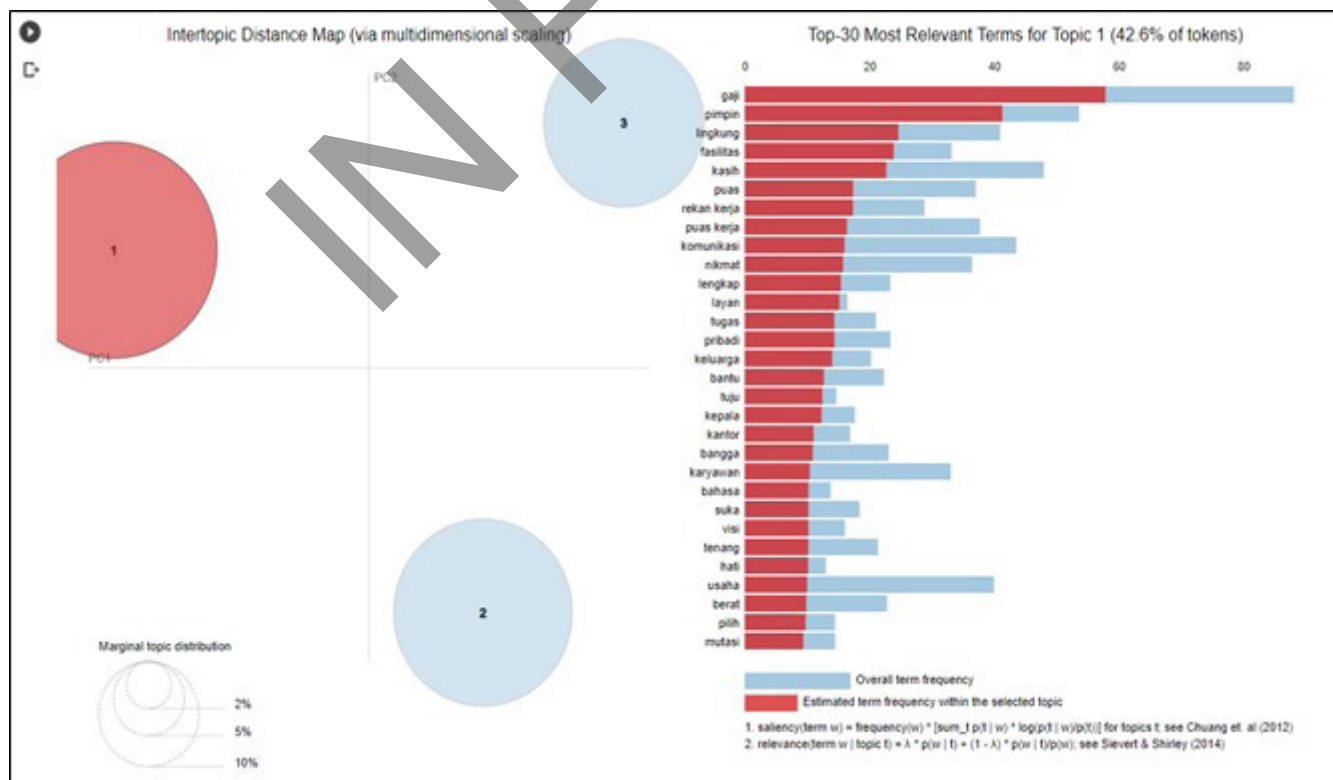


Figure 2 The pyLDavis Results for Topic 1

job satisfaction. These two emergent factors, uniquely identified through this interdisciplinary approach, are vital as they provide a richer and more contextually relevant understanding of the actual drivers of job satisfaction and turnover intention within these Indonesian organizations, moving beyond existing conceptual frameworks.

From the results of keyword searches (topic modeling) using LDA, it is evident that compensation, leadership, and work environment play a significant role in enhancing job satisfaction, which in turn increases employee retention. It can be seen in Figure 2, which shows the top 30 most relevant terms for Topic 1 (42.6% of tokens).

Figure 2 shows the 30 dominant keywords where the researchers only take the top 10 keywords, namely salary (*gaji*), leadership (*kepemimpinan*), environment (*lingkungan*), facilities (*fasilitas*), love (*kasih*), satisfaction (*puas*), coworkers (*rekan kerja*), job satisfaction (*kepuasan kerja*), communication (*komunikasi*), and enjoyment (*kesenangan*). These words conclude that compensation, leadership, and work environment affect job satisfaction. Salary (compensation) is in the first position, which is the benchmark for job satisfaction. Salary based on the responsibilities carried out by employees will bring job satisfaction to employees. Conversely, when the salary offered is not appropriate, it reduces job satisfaction, which in turn affects employees' intention to leave the

organization. Then, leader/leadership, work facilities, coworkers, and communication become benchmarks for job satisfaction, supported by work comfort, love for work and communication, and completeness of work equipment. That way, employees find pleasure in their work, which increases job satisfaction.

From the results of a keyword search (topic modeling) using LDA, it is evident that the work environment plays a crucial role in job satisfaction as a means of enhancing employee retention. The top 30 most relevant terms for Topic 2 (31.8% of tokens) can be seen in Figure 3. Figure 3 shows the 30 dominant keywords where researchers only take the top 10 keywords: business (*usaha*), communication (*komunikasi*), culture (*budaya*), work facilities (*fasilitas kerja*), colleagues (*rekan kerja*), employees (*karyawan*), position (*jabatan*), relationship (*hubungan*), working conditions (*kondisi kerja*), and enjoyment (*kesenangan*). The work environment, both in terms of facilities and infrastructure, and the relationship between employees and corporate culture, greatly influence employee performance (Aruldoss et al., 2022; Laraswani & Lubis, 2020; Taheri et al., 2020).

Based on the results of a keyword search (topic modeling) using LDA, it is evident that job stress, compensation, and leadership play a significant role in job satisfaction as a means of enhancing employee retention. The top 30 most relevant terms for Topic

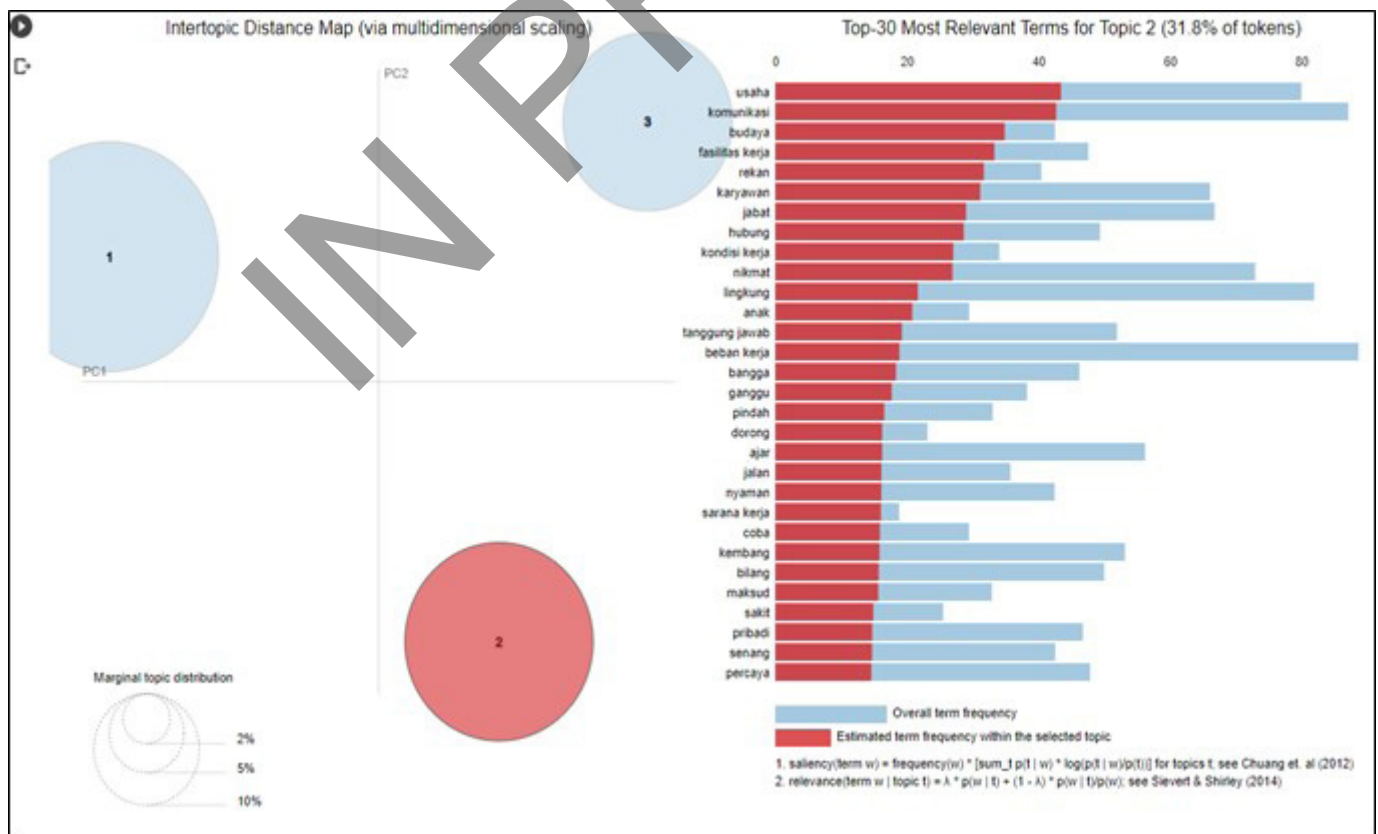


Figure 3 The pyLDAvis Results for Topic 2

3 (25.6% of tokens) can be seen in Figure 4. The researchers only take the top 10 keywords: workload (*beban kerja*), salary (*gaji*), love (*kasih*), money (*uang*), appropriate (*sesuai*), job satisfaction (*kepuasan kerja*), satisfied (*puas*), position (*jabatan*), believe (*percaya*), teach (*mengajar*), and accept (*menerima*). These words conclude that job stress, compensation, and leadership affect employee job satisfaction. Heavy workloads can be lighter if there is guidance from leaders to employees, and a sense of trust from leaders can provide employee job satisfaction. Salary (compensation) is a crucial factor in job satisfaction. An appropriate salary will certainly provide satisfaction for employees and vice versa. The description of the research analysis can be seen clearly in the scheme of the system dynamics program, which explains how each aspect influences the other.

Based on the findings in Table 1 (see Appendix) and the codification of keywords (topic modeling) using LDA, researchers have found that three variables: working environment, job stress, compensation support the system dynamics simulation model in maintaining the stability of turnover intention at the lowest possible level by paying attention to job satisfaction at work. Through data from interviews and observations of T and U Organizations, as well as a review of the literature, the researchers build a Stock and Flow diagram model in system dynamics, as shown in Figure 5.

Several factors are identified to influence job satisfaction and, consequently, turnover intention. Compensation is a major factor that not only motivates employees but also helps in retaining quality human resources. The research confirms that appropriate compensation directly impacts job satisfaction, aligning with definitions that describe it as the entire remuneration influencing motivation. The finding that unfair compensation increases turnover intentions is also supported by prior research. Indeed, the NLP-LDA analysis further underscores “salary” as the primary benchmark for employee job satisfaction, indicating that a salary commensurate with responsibilities brings satisfaction, while an inappropriate salary reduces it.

Furthermore, a positive work environment significantly influences employee job satisfaction. It encompasses facilities, infrastructure, employee relationships, and corporate culture, all of which contribute to performance and comfort (Azmy & Sigalingging, 2025; Bai et al., 2024). A constructive work environment is considered mandatory for organizational success and productivity. The LDA results explicitly linked keywords such as business, communication, culture, work facilities, colleagues, and working conditions to job satisfaction via the work environment, suggesting that a healthy work environment fosters comfort and satisfaction, thereby reducing turnover intention.

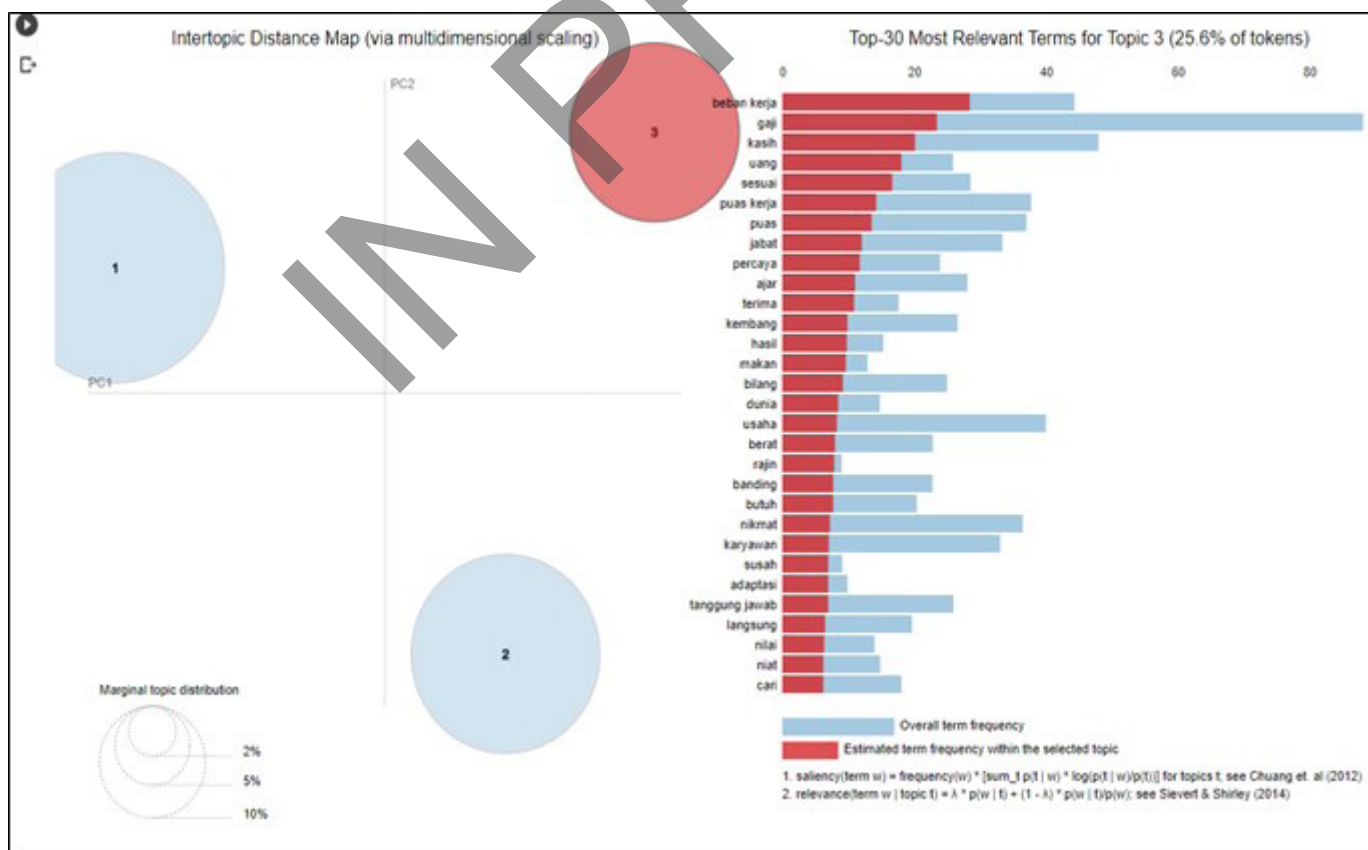


Figure 4 The pyLDAvis Results for Topic 3

Lower job stress contributes to higher job satisfaction and reduced turnover intention (Taheri et al., 2020). This statement aligns with the findings that job stress can lead to a decrease in productivity, can impact staff commitment, and can result in higher turnover rates. The LDA analysis connected workload to job stress, suggesting that good leadership can mitigate its impact on job satisfaction.

Based on Figure 5, the researchers state that building a positive or good work environment, providing appropriate compensation, and having low job stress can increase job satisfaction, thereby reducing employees' intention to leave the company (turnover intention). Additionally, interviews with employees from T and U organizations reveal that factors beyond work environment, compensation, and job stress also impact job satisfaction. The factors are gender inequality and leader character.

The following are the function in the Stock and Flow diagram model: Employment Time = 36; Final Time = 50; Hires = Smooth (Quits, 26); Initial Time = 0; Quits = Permanent Employees/Employment Time; Saver = Time Step; Time Step = 0.125; Permanent Employees = Integ (+Training Completions-Quits, 800); Training Completions = Trainees/Training Time; Trainees = Integ (Hires-Training Completions, 250); Training Time = 6; Contract Time = 24; Working in Contract = 200; Contract Completions = $0.75 * (\text{Working in Contracts} / \text{Contract Time})$. From the results of the model development, applying the five factors of employee job satisfaction increases job satisfaction. Then, increasing employee job satisfaction reduces employee turnover intention, which in the built model is referred to as "quits". Based on Figure 6, it can be concluded that increasing job satisfaction (worker satisfaction) reduces turnover intention. The

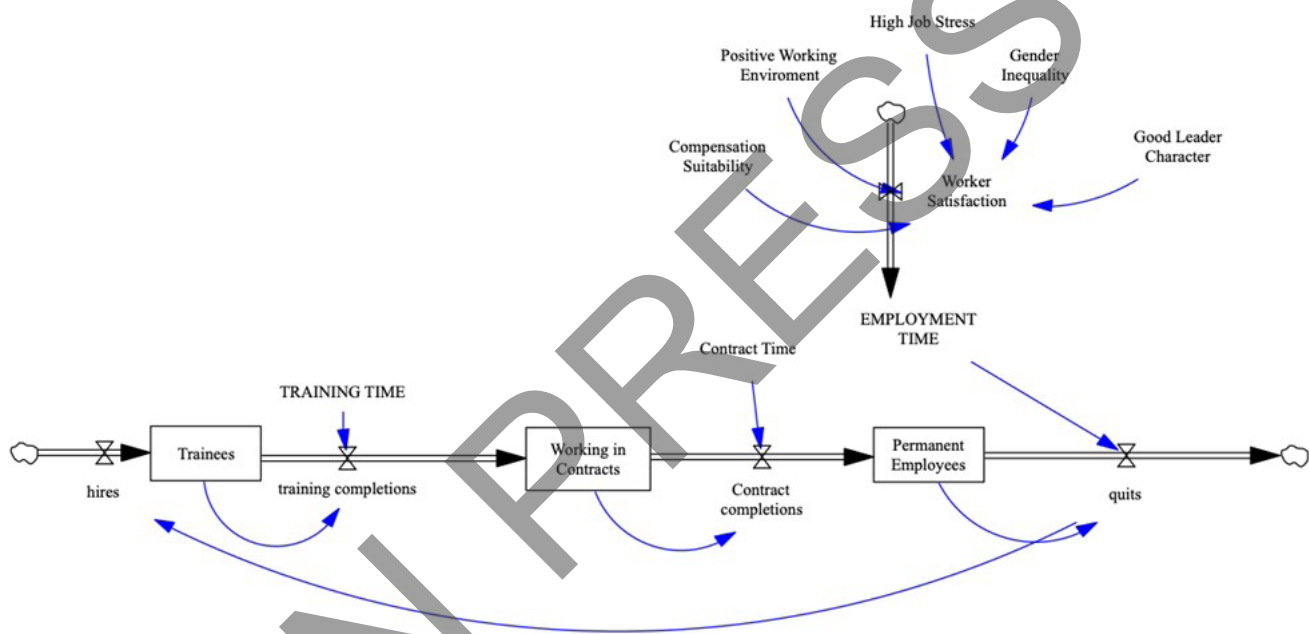


Figure 5 Stock and Flow Diagram

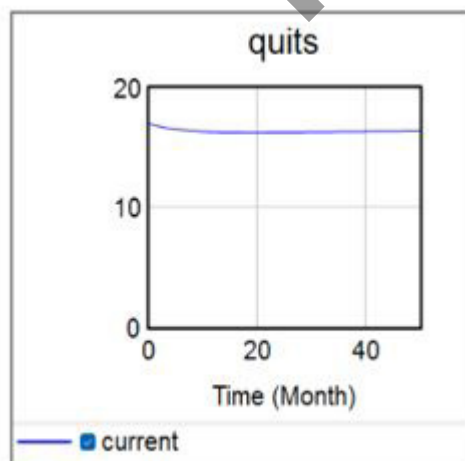


Figure 6 Timeline Graph for Quits

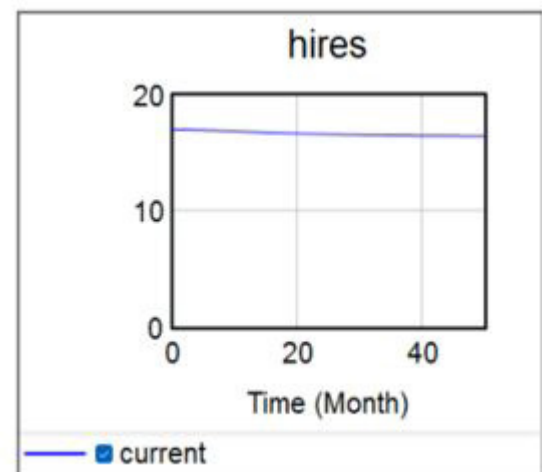


Figure 7 Timeline Graph for Hires

result is reflected in the level of employees leaving the company (quits). The “quits” curve slowly begins to decrease and has reached its stability point.

In Figure 7, it is known that the “hires” curve has also decreased and reached a stable point. It is because the output from the “quits” curve is proportional to the input from the “hires” curve. The “hires” curve can be higher if employee job satisfaction (workers’ satisfaction) decreases. It can be due to one or more factors like work environments, compensation, job stress, gender inequality, and the leader character that experiences decrease or increase. Therefore, job satisfaction has decreased, leading to employees deciding to leave the company (turnover intention), as indicated by the “quits” curve.

When the “quits” curve decreases, the “hires” curve automatically decreases due to the need for employee fulfillment at the company to carry out its operations. A decrease in the “hires” curve will result in a decrease in the “trainees” curve. The trainees are new employees who are in the training stage (training time) for six months according to the work position they will occupy (see Figure 8).

The “working in contract” stage is a critical phase in employees’ journey (see Figure 9), commencing after they have successfully completed a six-month “trainees” period. At this stage, employees are contracted for 24 months or 2 years. The “working in contract” curve initially increases, driven by the growing need for permanent employees within the organization, as trained individuals are transitioned towards “permanent employees”. This phase is interconnected with overall workforce dynamics: enhanced employee job satisfaction (worker satisfaction) significantly reduces “quits” (employees leaving), which in turn decreases the need for “hires” (new recruitment). A reduction in “hires” then leads to a decrease in the “trainees” curve, subsequently impacting the inflow into the “working

in contract” stage. The flow indicates a more stable workforce. Factors influencing job satisfaction that affect these dynamics include the work environment, compensation, job stress, gender inequality, and the leader character.

Permanent employees have completed their contract period at the company. The calculation of employee time begins in the permanent employee period, which is 36 months or 3 years (see Figure 10). It is also along with considering whether employees are satisfied with their work or not. The research delves into the influence of system dynamics methods on work environment, compensation, and job stress, mediated by job satisfaction, on turnover intention. The primary goal is to comprehend the role of these methods in shaping employee retention. Crucially, at this stage, organizations must continuously assess employee job satisfaction, as it is a pivotal factor directly influencing turnover intention. The research investigates how a positive work environment, fair compensation, and managed job stress contribute to this satisfaction, thereby reducing the intent to leave. Conversely, high job stress or inadequate compensation can increase turnover. Additionally, gender inequality in compensation and the leader character are identified as emergent factors impacting job satisfaction.

The research offers several contributions to the theoretical understanding of employee turnover and retention (Abdolmaleki et al., 2024; Tandung, 2016). Job satisfaction greatly influences turnover intention. Job satisfaction is influenced by the work environment, compensation, job stress, gender equality, and leader character. Initially, prospective employees will be trained (training). After the employees have completed the training, they will work for the company as contract workers first (working in contract). Next, the employee will become a permanent employee (permanent employees) after completing the employment contract. Then, the employee will start working for

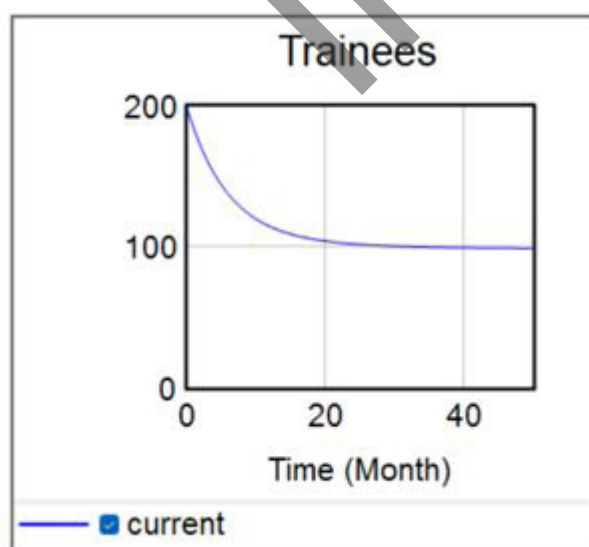


Figure 8 Timeline Graph for Trainees

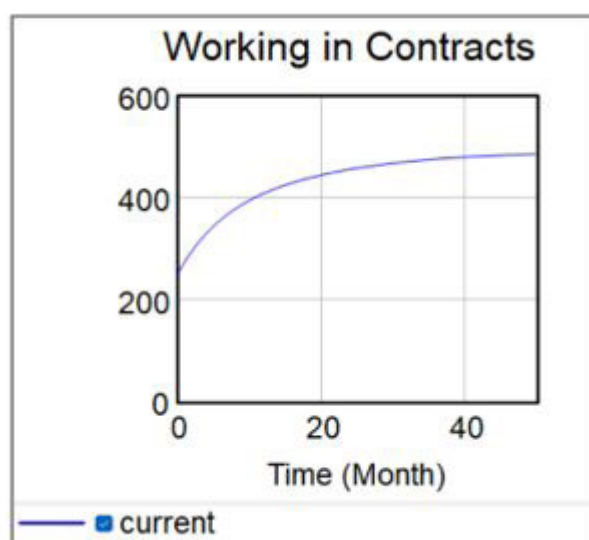


Figure 9 Timeline Graph for Working in Contract

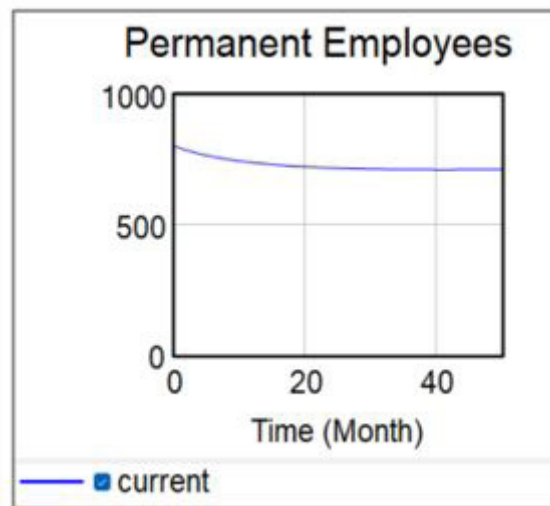


Figure 10 Timeline Graph for Permanent Employees

the organization/company. In this work process, employees can assess whether they are satisfied with their current job by considering the work environment, compensation, job stress, gender equality, and leader character. If employees are satisfied, they will stay. However, if they are not satisfied, employees will choose to leave the company (turnover). Then, when employees leave the company, “quits” will increase so that the company will open job vacancies indicated through “hires”. Hence, the company does not lack employees to carry out its operational activities.

In summary, the integration of all identified factors—both the well-established (work environment, compensation, job stress) and the newly emergent (gender inequality, leader character)—into the system dynamics model allows for the simulation of policies designed to enhance employee job satisfaction and stabilize turnover intention. The model simulation results unequivocally demonstrate that increasing job satisfaction (referred to as ‘worker satisfaction’) effectively reduces turnover intention, which is reflected in a decrease in the “quits” curve until it reaches a point of stability. Correspondingly, as the “quits” curve decreases, the “hires” curve also shows a proportional decline and stabilizes, indicating a reduced organizational need for recruiting new employees. This situation is directly translated into significant cost efficiencies in recruitment and training. Moreover, the model illustrates an increase in the “working in contract” and “permanent employees” curves, signifying successful employee retention and workforce stability over time. Collectively, these simulations provide a powerful predictive tool for decision-makers to accurately evaluate the impact of policies aimed at improving job satisfaction and mitigating turnover, reaffirming the critical mediating role of job satisfaction in effective employee retention.

Gender discrimination in the workplace is a common phenomenon worldwide (Memon & Satpathy, 2020). Gender inequality in the workplace

is a persistent and pervasive problem that has received significant attention from scholars, policymakers, and practitioners in recent decades. Despite the significant progress made in promoting gender equality in the workplace, women are still being discriminated against based on their gender. These barriers and biases not only affect women’s career prospects and economic security but also have wider social and economic consequences for organizations and society (Catalyst, n.d.; Memon & Satpathy, 2020). Women are underrepresented in leadership, particularly in top management and executive positions. They are less likely to be hired despite having similar qualifications and are paid less than their male counterparts (Bruckmüller & Braun, 2020).

Competition in the increasingly advanced business world requires every organization or company to manage its resources properly and efficiently, especially human resources (Herawati & Ranteallo, 2020). One important aspect that influences an organization’s success in achieving its goals is the job satisfaction of its employees or members. In this case, the leader plays a crucial role in enhancing job satisfaction (Angraini et al., 2022). One of the factors that influences turnover intention and needs attention is the personality trait of the leader (Susanto et al., 2019).

CONCLUSIONS

The research successfully investigates the system dynamics of employee turnover intention, emphasizing the mediating role of job satisfaction within T and U organizations by utilizing a qualitative approach, NLP-LDA, and system dynamics model. The model simulations reveal a significant relationship between job satisfaction and turnover intention, with increased job satisfaction effectively stabilizing turnover intentions. The findings align with and further elaborate on existing literature by identifying and

modeling key factors that influence job satisfaction and, subsequently, turnover. Job satisfaction is widely recognized as a crucial factor influencing employees' turnover decisions, with satisfied employees being more likely to remain with their organizations. Previous studies also support the idea that job dissatisfaction prompts employees to consider leaving their current roles. Ultimately, the research provides a valuable framework for understanding the intricate interplay between employee turnover intention and job satisfaction, offering practical insights for organizations and guiding future academic endeavors in the dynamic field of human resource management.

Beyond those traditional factors, the qualitative data analysis and LDA also uncovered additional and significant drivers of job satisfaction and turnover intention. First, gender inequality in compensation is highlighted by informant data, where male employees reportedly receive higher earnings than female employees for similar work, causing dissatisfaction. This situation reinforces the pervasive global issue of gender discrimination, where women are often paid less despite similar qualifications. Second, leader character significantly impacts employee satisfaction. Positive leadership, involving guidance, delegation, support, knowledge sharing, and fostering a non-tense environment, enhances job satisfaction. It is supported by literature emphasizing the leader's important role in increasing job satisfaction and influencing turnover intention. LDA analysis also highlights leadership as a crucial keyword affecting satisfaction. Third, other external factors, such as family considerations (e.g., spouse relocation or returning home for family reasons) and success in civil servant exams or expiring contracts, also contribute to turnover. It is often irrespective of compensation.

The research provides clear and actionable insights for organizational decision-makers seeking to enhance employee retention and stabilize their workforce. Organizations should strategically invest in initiatives that directly boost job satisfaction, as this is the most effective approach to curtail turnover intention. Employers must re-evaluate compensation strategies to ensure fairness and competitiveness, moving beyond fixed salaries to incorporate performance-based adjustments and incentives. Cultivating a conducive work environment, encompassing physical facilities, a supportive corporate culture, and healthy interpersonal relationships, is crucial, as it fosters comfort and reduces stress, leading to greater job satisfaction and employee retention. Proactive stress management, through clear role expectations, supportive leadership, and manageable workloads, is vital to prevent dissatisfaction and turnover. Then, organizations should prioritize empowering leadership development, focusing on leaders who provide guidance, trust, and opportunities for growth, given their significant influence on employee job satisfaction. Furthermore, companies must actively identify and rectify instances of gender inequality, particularly in compensation, to promote fairness and

prevent widespread dissatisfaction among employees. Finally, the research advocates the use of system dynamics models as a valuable tool for decision-makers to simulate and evaluate the long-term impacts of various retention policies, allowing for proactive and informed strategic planning.

It empirically supports and reinforces the established theory of job satisfaction as a critical mediator between various organizational factors and employee turnover intention within a specific context. The research's novelty lies in its unique leverage of NLP with LDA to uncover context-specific and emergent factors (such as gender inequality in compensation and leader character) from qualitative data. By integrating these NLP-driven insights directly into a system dynamics model, the researchers provide a more nuanced and holistic understanding of complex retention dynamics than approaches that focus solely on traditional factors. The research demonstrates the powerful synergy of qualitative research, NLP-LDA, and system dynamics modeling for analyzing complex human resource phenomena, providing a robust framework for identifying critical variables and simulating their long-term interactions. The result can provide a deeper understanding that traditional linear models may miss.

The research, while yielding significant insights, acknowledges certain limitations that open avenues for future exploration. Firstly, the primary data collection method is qualitative. While providing in-depth information, future researchers can incorporate quantitative methods to strengthen the generalizability and robustness of the findings. Secondly, the discussion on gender inequality primarily focuses on payroll, with limited exploration of other aspects such as gender-related factors within the work environment or its potential influence on job-related stress. Lastly, the study is conducted in specific organizations in Indonesia. This context-specificity means that while findings are insightful for these settings, their direct transferability to other industries or regions without further validation may be limited.

Based on these limitations and the findings, several promising avenues for future research are suggested. Future research is encouraged to integrate quantitative methods in data collection to complement the qualitative insights, allowing for broader statistical generalization and verification of the causal relationships identified. Expanding the research scope to encompass diverse industries or sectors and research sample areas across Indonesia can provide a more comprehensive understanding and enhance the accuracy and relevance of the findings. Future researchers can also delve deeper into other potential factors, both mediating and non-mediating, that contribute to employee job satisfaction and turnover intention, as the human element is complex. Finally, for organizations seeking to utilize the Stock and Flow diagram model, customization based on their specific organizational context is strongly advised to ensure optimal accuracy and applicability.

AUTHOR CONTRIBUTIONS

Conceived and designed the research and analysis, M. M. W. and D. S.; Collected the data, M. M. W.; Contributed data or analysis tools, M. M. W. and D. S.; Performed the analysis, M. M. W. and D. S.; and Wrote the paper, M. M. W. and D. S.

DATA AVAILABILITY

The participants of the research did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available..

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APPENDIX

Table 1 Research Variables and the Results in the Research

Variable	Source Variable
Job Satisfaction	<p>Ms. M was satisfied with her current job with the guidance of her superiors and support from coworkers. However, sometimes, she felt dissatisfied with her ability to contribute to the organization. She said, “Sometimes if you make a mistake, you immediately think that this is not good.”</p> <p>Mrs. A enjoyed her current job with the experience of working in other forms of organizations with different working positions. She felt that working in the U Organization with her current working position was very enjoyable.</p>
Compensation	<p>Mr. D said, “I have heard of coworkers leaving for other places because the salary is higher. Some do not enter the company because of that; negotiations do not take place.”</p> <p>He continued, “The organization needs to have further discussions because until now, as far as I know, there is no adjustment for salary according to performance or achievements. So, the salary is fixed every month like that. Yes, if there is a violation, there will be a deduction. However, when it comes to extraordinary work, for example, or something like that, it seems that until now, there are still no such things. Therefore, this issue needs to be discussed further in the future. We hope that the compensation payroll method needs to be adjusted to things like that. That is one method to motivate employees.”</p>
Work Environment	<p>Mrs. L said, “For me, what is prioritized at work is the environment because we are created or become a habit from our environment. If our environment is suitable, it will impact others, our work, and our relationships with other people. It will hit, it will connect.”</p> <p>She followed up by giving an example, “if we work in a place with a high salary but the environment is a lot of pressure, we do not get along with coworkers, and the environment is also not conducive, even though the salary is high, for me, it is not worth it.”</p>
Job Stress	<p>Mrs. FN felt quite happy while working. The workload she felt was initially quite stressful and burdensome, but now she felt normal.</p> <p>Mr. R did not feel that his responsibility was a burden, but a challenge to be completed properly. He was quite satisfied with the salary resulting from his performance.</p>
Inequality	<p>Mrs. A said, “There is injustice in the pay system where male employees have higher earnings than female employees of the same level. Even though the work and responsibilities are the same, the pay is different.”</p>
Leadership	<p>Mrs. JS, as an employee in T Organization, conveyed “their leaders believe in them to improvise at work. Leaders always try to develop their potential through the delegation of work that is usually beyond their abilities, and leaders pay attention to them. My leader is very good; he has vast knowledge and shares it with others. He also always guides and opens our minds so that we can think broadly. I learn a lot and gain knowledge and new things.”</p> <p>Ms. SPS said, “Sometimes, I also joke with Mr. ST and Mr. O, so the conditions at work are not tense.”</p> <p>Ms. M said, “Usually, my leader treats me to a meal. After the holidays, my leader also likes to bring souvenirs, gifts, or snacks.”</p> <p>Ms. L from U Organization said, “Leaders give me a belief. When I am asked to do something, I am never limited, so I am told to be creative, to innovate new things.”</p>
Family/Couple/Passing the government test/Out of Contract/ Location of the Organization	<p>Mr. D said, “Colleagues are still allowed to develop themselves outside the organization. If it is important, the organization will facilitate both within the city and outside the city. Although not all proposed activities can be facilitated, some are still supported.”</p> <p>Mr. D said, “Some may see better prospects for self-development in other places. Our location here is at the far end of Indonesia, so those who, for example, come from Java, feel that a career in Java is safer and closer to their family. Some are married, and their husbands have moved locations.”</p> <p>Mrs. L said, “Most of those who resign are not out of pay but move out of town, moving with their husbands like that. Or that employee or her husband is accepted as civil servants. For example, if his wife works here, whether he wants to move or not, or if he wants to go back to the village, his parents tell him to do it, especially friends who are far from Java. If, suddenly, his parents get sick, he is asked to come back, he has no choice whether he wants to go home.”</p>