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Balancing Work and Family: A Systems View of Wellbeing in the Construction Industry

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Abstract

This study dives into work-family conflict among construction workers, examining how work flexibility and organizational and family support impact job and family satisfaction in an industry known for high stress and risk due to its project-driven nature. Using system dynamics simulation, we crafted a model based on literature, navigating variable relationships, circular patterns, quantitative functions, validating behavior, and proposing scenario-based policies. Findings show elevated levels of work interference with family conflicts (WIFC) and family interference with work conflicts (FIWC) among construction workers. Increased work flexibility and organizational support enhance satisfaction and performance in both work and family domains, while improving family support significantly boosts job satisfaction. Departing from previous research based on surveys, this study introduces a new approach called system dynamics model simulation to describe the evolution of work-family conflict among construction workers. Crafting a two-way dynamic model from existing literature yields theoretical insights and actionable recommendations for managing this conflict in the construction industry.

Keywords: Construction employees, construction industry,work-family conflict, system dynamics, simulation

1. Introduction

Work-family conflict is a significant issue that has far-reaching negative impacts on the lives of employees, affecting their work, family, physical and mental health, and overall well-being. This conflict often leads to heightened levels of job stress and dissatisfaction, and in severe cases, it may result in employees resigning from their positions. Furthermore, the work-family conflict also has substantial implications for organizations, influencing their strategies, performance, commitment, and the psychological attachment of employees to the organization (Kahn et al., 1964, Movahed et al., 2023). Despite its importance, the construction industry has largely neglected the work-family relationships of its employees.

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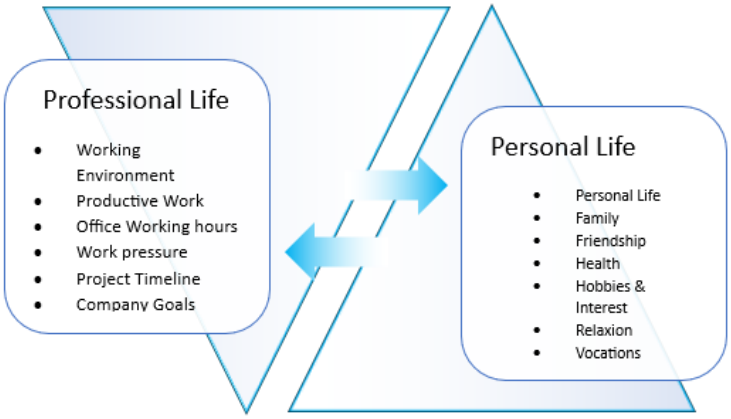


Fig 1. Achieving Work-Life Integration: Balancing Personal and Professional Spheres for Mutual Fulfillment (Irfan et al., 2021)

Research has shown that the demands inherent in the construction sector exacerbate work-family conflict compared to other industries. Factors such as high risk, heavy workload, and long project durations contribute to long working hours, overtime, and elevated levels of work-family conflict among construction employees (Toan et al., 2023, Ghahremani-Nahr et al., 2023). Considering the pivotal role these employees play in achieving project goals and success, investigating work-family conflict and its relationship with family life becomes crucial. In recent years, work-family conflict has gained growing public interest. Previous research on this topic has primarily been quantitative and empirical, relying heavily on survey questionnaires. However, empirical research in the social sciences often faces challenges related to data quality and the repetitive nature of findings. Therefore, it is essential to incorporate diverse research methods to gain a more comprehensive understanding of work-family conflict, rather than solely relying on quantitative validation (Gutek, 1991).

Among the several models available to investigate this issue, including statistical methods and questionnaire analyses, system dynamics is a model that allows visualization of dynamic relationships between system components in a non-linear manner. Furthermore, system dynamics allows simulation to show the potential impact of a specific policy on system behavior (Irfani et al., 2019, Bathaee et al., 2023).

Using a dynamic system simulation model to analyze and understand the dynamic evolution of work-family conflict among construction industry employees, this study creates a new approach using existing literature to better understand the relationships between work and family. System dynamics is a powerful approach used to evaluate models of conflict between work and family domains. It offers several advantages that make it particularly suitable for studying the complex and dynamic interactions between work and family life. The dynamic system model shows the interactions of work-family relationships throughout the life cycle of construction projects. Through simulation, this study aims to identify the internal patterns of work-family conflict evolution in both work and family environments. The findings of this research are expected to provide both theoretical insights and practical recommendations for the effective management of work-family conflict in the construction industry (Frone et al., 1992, Nozari & Ghahremani-Nahr, 2023).

1.2. Dynamic Hypothesis

The dynamic system approach is a method used to model, simulate, and analyze complex systems. The work-family life of employees in the construction industry is a complex and dynamic system influenced by various interacting factors. Adopting the dynamic system approach provides a valuable perspective to understand and manage this intricate system. By strategically considering collected variables and observing

interactions between work and family domains, a comprehensive outlook can be achieved (AlKahtani et al., 2000). The system dynamics framework offers a precise means of analyzing work-family conflict, allowing researchers to understand the underlying dynamics of this phenomenon. In this study, a two-way dynamic model framework is established A new model has been proposed by leveraging existing literature. based on a literature review, enabling the analysis of the evolution of work-family conflict among construction industry employees. Subsequently, a dynamic system model is developed to simulate and draw conclusions about the complex nature of work-family conflict in this context (Irfani et al., 2019).

2. Literature Review

2.1. Work-Family Conflict

Early research on work-family conflict (WFC) was largely based on a role theory perspective. This theory considers work-family conflict as stress caused by role conflict caused by the incompatibility of a person's work and family roles. In fact, it can be stated that work-family conflict is the conflict and pressure that is placed on a person to change between the two incompatible roles of work and family (Turner et al., 2009). Greenhaus and Beutell first put forward the explicit definition of work-family conflictin 1985. They stated that work-family conflict is "a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect". They identified three forms of WFC, namely (1) time-based WFC; (2) strain-based WFC, and (3) behavior-based WFC (Toan et al., 2023). This concept has been adopted in the academic community as a means to form a basic consensus. Traditionally, WFC research was uni-directional; the focal point was strictly on the conflict that occurred when work interfered with family. However, when probing more deeply into this field of study, Gutek et al. found that each of the three forms of conflict proposed by Greenhaus and Beutell has two directions, namely work interfering with family and family interfering with work. On this basis, Frone et al. proposed a bi-directional concept of WFC, thus dividing WFC into two types ofconflict: (1) work interference with family conflict (WIFC) and (2) family interference with work conflict (FIWC) (Suryani et al., 2022). Equally, in the past, the idea emerged that the resources of a company are the basis of its competitive strategy, and that "knowledge" and competencies are one of the most important strategic resources (Susanty et al., 2023). Even so, in an age of a global modern economy based on knowledge, the effectiveness and efficiency of tourism enterprise resource sustainable management are paramount and influenced by various internal and external variables, such as knowledge, learning, and culture as well as the business environment (Dodanwala et al., 2022).

2.2. Managing Work-Family Conflict during Crisis and Pandemic: Challenges and Solutions

Small and medium-sized enterprises (SMEs) development is accompanied by digital transformation, such as sales through e-commerce platforms, marketplaces, social media, and other digital channels SMEs with advanced e-commerce channels benefit from digital platforms. Indeed, the performance and conflict between family and employees during the recent crisis and global pandemic of COVID-19 have been the subject of considerable debate. The unprecedented circumstances brought on by the pandemic have disrupted traditional work-family dynamics and created new challenges for individuals and organizations alike (Ogutu et al., 2023). The widespread adoption of remote work, changing childcare arrangements, and health concerns have all contributed to the complexities of balancing work and family responsibilities. During the coronavirus infectious disease (COVID-19) pandemic, the issue of whether SMEs would survive or fail emerged. COVID-19 has radically changed the business landscape and motivated enterprises to implement mitigation measures to survive in this rapidly changing environment (Khakbaz & Hajiheydari, 2015).

2.3. Striking a Work-Family Balance for Employees

In today's competitive environment, organizations are seeking success by leveraging their employees' strengths and diversity. Universities, to achieve this, must attract and nurture an engaged, healthy, and high-performing workforce through stimulating work environments that promote work-family balance, work motivation, job satisfaction, and overall job commitment. This study focused on investigating the effects of work motivation, job satisfaction, and work-family balance on job commitment among library personnel in North-central Nigeria. The findings revealed that these factors significantly impact job commitment, with job satisfaction being the most influential (41%). The article recommends that university administrators, library managers, and policymakers prioritize work-family balance, work motivation, and job satisfaction to enhance employee job commitment, especially among library personnel (Popoola & Fagbola, 2023).

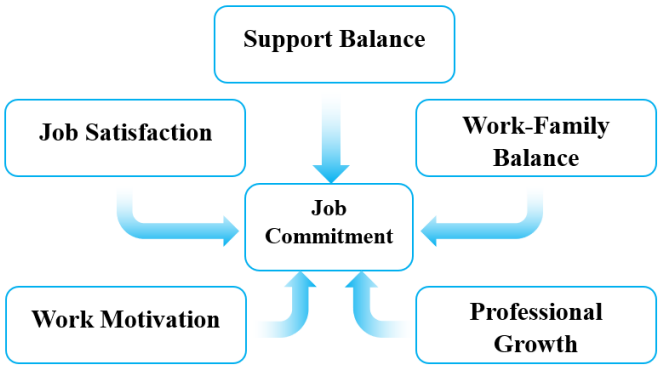


Fig 2. Conceptual model of the study

According to the study, which also showed that there are significant joint effects of work motivation and work-family balance on job satisfaction againIn addition, fans individually, work motivation and work-familyBalance had a significant effect on the respondents' job satisfaction. As pointed out by (Kulibrek et al., 2018), job satisfaction is a key element of Work motivation, which is a fundamental determining factor for employee Behavior (job commitment) in an organization (Manenzhe et al., 2023).

2.4. Employee Behavior in Work-Family Balance

Undoubtedly, moving toward new technologies is inevitable for organizations. So rapid development in information technology has led to great changes in different areas of politics, economy, and business. So before importing and introducing a novel technology, it’s important to analyze its various aspects and impact on organizational behavior (Zhu et al., 2023). Nowadays, human behavior is becoming one of the most important issues that influence organizations, which affects the values and roots of technology adoption in an organization. Technology changes people’s behavior in the organization with ever-increasing changes (Xie et al., 2023). In a sense, the collection of people’s beliefs, know-how, and skills that can be featured toward digitalization is recognized as digital readiness which is involved in both people and organizations (Zhang et al., 2023). Employee behavior exhibits diversity at different times and environments, with obvious characteristics of complex systems. Cellular automata (CA) is a mathematical model with discrete time, space, and state, suitable for complex dynamic system problems that are difficult to quantitatively describe mathematically (Flannery et al., 2019).

System dynamics (SD) is a simulation-based approach for sorting out real-world intricacies by using causal relationships and polarity among variables [10;34;35]. SD is used to explore the behavior of social systems over time. It has been successfully applied to the manufacturing and construction industries (Dodanwala et al., 2022). In the 1950s, this approach was suggested by Forrester from the Massachusetts Institute of Technology. Since then, it has evolved into a separate subject (Fordjour et al., 2019). It is based

on the concept of ST. An SD model uses a feedback mechanism where the values are inserted based on expert opinion (Frimpong et al., 2022). We have many issues in economics such as economic growth, employment, industrial transformations, etc. Unemployment is one of several important issues facing modern society. Unemployment forecasting is an important task for economists, forecasters, and policy-makers surrounding the economic downturn. System Dynamics (SD), which facilitates the modeling of complex phenomena, a simulation, and an analysis of nonlinear behavior over time, is perfectly suited for predicting complex systems in uncertain situations (Mahmoodi et al., 2022). The SD models provide more reliable predictions of short- and long-term trends than statistical models and allow policymakers to determine reasonable scenarios with input to decisions and policies (Yang & Gan, 2021).

2.5. A Systems Dynamic Approach To Examining Employee Work-Family Balance

In today's fast-paced and demanding work environments, achieving work-family balance has become a critical concern for employees and organizations alike. To better understand the complexities and dynamics of work-family balance, researchers are increasingly turning to the system dynamics approach (Duan et al., 2023). The construction industry poses a demanding work environment, leading to significant work-family conflict affecting job and family satisfaction. Using a dynamic model, the study reveals construction employees experience higher work interference with family conflict (WIFC) than family interference with work conflict (FIWC). Improving work flexibility and organizational support positively impacts overall satisfaction and performance. Enhanced family support notably contributes to job satisfaction (Wu et al., 2016). A system dynamics approach provides a powerful framework to study work-family balance as a dynamic and interconnected system. Instead of viewing work and family domains in isolation, this approach recognizes them as interdependent and constantly influencing each other. By modeling the feedback loops, delays, and causal relationships, researchers gain deeper insights into the factors shaping work-family balance (Zhang et al., 2023). In a study involving 281 dual-employed couples, the research delves into work-family dynamics. It unveils a reciprocal relationship for males and a unidirectional pattern from family to work for females. The findings underscore the importance of recognizing dynamic models in literature, hinting at potential organizational support to ease fixed family demands (Tenbrunsel et al., 1995). Through the application of system dynamics modeling, researchers can explore various scenarios and interventions to improve work-family balance for employees. This approach helps identify leverage points and potential policies that can promote better balance, enhance job satisfaction, reduce work-family conflict, and increase overall well-being among employees (Shen, 2023). Previous study explores daily work-family balance satisfaction (WFBS) dynamics, emphasizing the impact of work and family conflicts. Negative work reflection mediates work conflict's effect on WFBS, and negative affect mediates family conflict's influence. Notably, increasing family social resources serves as a beneficial buffer, moderating negative effects. The research enhances our understanding of within-person WFBS dynamics (Wan et al., 2021). By examining employee work-family balance with a system dynamics approach, organizations can gain a comprehensive understanding of the challenges employees face, the impacts of organizational policies, and how changes in one aspect of the system may affect the overall balance (Riaz et al., 2023). Ultimately, this research can pave the way for evidence-based strategies to create supportive work environments that prioritize work-family balance, boost employee productivity, and foster a healthier and more engaged workforce (Jo et al., 2023).

Table 1. The latest research on work-family conflict

Researchers	The target society	Approach	Data used
Ahmad et al.,2023	All public secondary schools in Sargodha region	Two-stage random sampling method and using statistical analysis	390 public secondary schools including 1954 high school teachers
Isa & Indrayati.,2023	All tax civil services in the individual area	Data collection from the questionnaire and analysis using the partial least squares method	A sample of 254 people was selected from 694 participants
Irfan et al.,2023	Workers of a construction project	The data collection of this research was done through the "questionnaire" technique and the analysis method was a statistical model and regression analysis.	-
Riyami et al.,2023	Managerial and non-managerial employees in Omani business organizations	Data analysis using structural equation modeling	Data were obtained through convenience sampling of 249 managerial and non-managerial employees in Omani business organizations
Sedjati et al.,2023	Kendall Policewomen are married or have families	The method of data collection and analysis using questionnaires and statistical analysis	-
Galardo & Trottier, 2022	A crowd of construction workers on site in Quebec, Canada	Data collection from the questionnaire and analysis using the partial least squares method	811 workers in the Quebec construction industry
Saputro et al.,2022	Lecturers and employees of Telkom Institute of Technology Purwokerto	Sampling by random sampling and multiple linear regression analysis with the help of the SPSS computer program	112 people with the participation of professors and employees of Telkom Purwokerto Institute of Technology who are married or have children
Panojan et al.,2022	Some surveyors in Sri Lanka	Data collection and analysis were done using questionnaires and factor analysis of variance	115 expert surveyors
Oyewobi et al.,2022	Professional female professionals in the Nigerian construction industry	A conceptual model for formulating hypotheses and PLS-SEM path method	120 professional women in the construction industry
Margareth & Satrya,2021	Management employees in Indonesia	Data collection using a structured questionnaire and production and distribution for data analysis using structured equation modeling.	202 management employees from an organization in Indonesia
Zhang & Bowen,2021	South African Construction Specialists	Testing research hypotheses from structural equation modeling (SEM)	864 data through an online survey for construction professionals in the relevant statutory councils

In the review table presented, some of the studies conducted in recent years (2021 to 2023) have been discussed in relation to the issue of work and family conflict, which shows that in recent years, the studies and research conducted in this field It was mostly with the questionnaire technique. Statistical analysis has been used. According to Table 1, in this research, we intend to address the issue of conflict between workers and families in the construction industry by using dynamic system modeling, which is one of the powerful simulation models in complex issues such as the construction industry. Let's explore this issue and use it to get the results and the right way to solve this issue.

3. Methodology

System dynamics is a powerful method used to model, simulate, and analyze complex systems (Beigian et al., 2022). Due to the complexity of the problem, the system dynamics methodology was chosen as the appropriate method for modeling the factors influencing the conflict between work and family. Based on the methodology provided by Sterman (Sweeney & Steman, 2000), five steps have been considered for the modeling process of this problem as shown in Figure _3. The first step involves framing the problem (Faizabadi et al., 2022). At this stage, various aspects of the subject under discussion are reviewed based on the existing important literature, and the required information is collected. In the second step, the dynamic hypothesis of the research, which is the structure of the desired problem, is created. The structure of the problem means the mutual effect of the variables in the problem on each other. The dynamic hypothesis is a theory that explains the behavior of the system according to the dynamic characteristic of the problem. The dynamics of the hypothesis have been compiled using subsystems, cause and effect loops

diagram, and problem flow. The third stage is dedicated to formulation. At this stage, the dynamic hypothesis is converted into a simulated model by Vensim software. For this reason, parameters and mathematical relationships between variables are examined and estimated. In the fourth step, to ensure the validity of the simulated model, that model is examined. Structural validity of the model precedes behavioral validity, in other words, priority The main way to structure the model is conceptually. Because this structure determines the behavior of the model and gives meaning. The validity of the behavior of the model can be checked only when the structure of the model is valid (Shi & Gil, 2005). In the last stage, after checking the validity of the model, using the desired policies and scenarios, we examine the behavior of the model under these policies, and based on the behavior of the model, we provide suggestions to improve the problem.

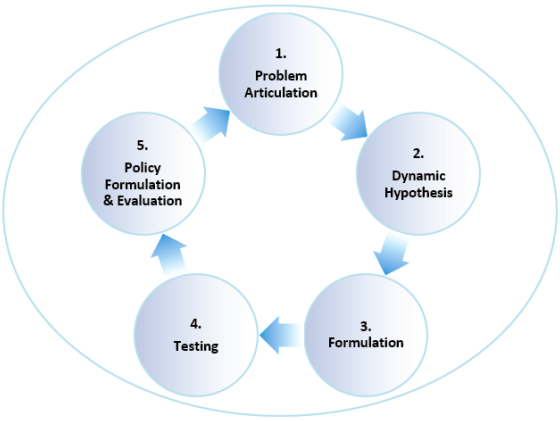


Fig 3. System dynamics method (Source: Sterman,2000;148)

3.1. Construction Industry And System Dynamics

As mentioned in the previous sections, the construction industry has high-pressure conditions and many risks that complicate the understanding and simulation of this system (Shahvali et al., 2021). Considering the very few researches that have been done in this field using system dynamics (table_1) and also the ability of this method to understand complex systems such as the construction industry, it can be used to discover the complexities of the working life of employees in this The specific industry used is known as a dynamic and multifaceted system with various interconnected factors (Lane et al., 2016). Using system dynamics, we can gain valuable insights for understanding and effectively managing this complex system, especially when considering the interactions between work and family domains. This study proposes a two-way dynamic model framework for understanding work-family conflicts in the construction industry, based on a comprehensive literature review. Through a dynamic systems model, it simulates the interactions between work and family domains, leading to a deeper understanding of the underlying dynamics that contribute to conflict. As a result, we can draw meaningful conclusions about the nature of this conflict and explore potential solutions and optimization ways.

3.2. Model Boundary

In a general case, the model's boundary encompasses critical variables and relationships relevant to the analysis of work-family conflict (WFC) and job stress. The key components of the model include:

1. Variables: The model incorporates essential variables contributing to work-family conflict and job stress. These variables can vary depending on the specific context but may include factors such as occupation, family pressure, family participation, job involvement, job pressure, family involvement, and family conflict.
2. Classification: Work-family conflict (WFC) is classified into distinct dimensions, such as work interference with family conflicts (WIFC) and family interference with work conflicts (FIWC).

This classification allows for a comprehensive understanding of the various aspects of work-family conflict.

3. Outcome Variables: The model examines outcome variables related to work-family conflict, which may differ in different scenarios. Examples of such outcome variables are job satisfaction, job performance, family satisfaction, and family performance. These variables reflect the consequences and impact of work-family conflict on both work and family domains.
4. Dynamic Model Framework: The model takes the form of a dynamic framework that analyzes the evolution and interaction of work-family conflict over time. The specific structure and dynamics of the model can be tailored to the context under investigation, considering the complexities and interactions between work and family domains.
5. Relationships: The model establishes both direct and indirect relationships between the identified variables. These relationships showcase how certain factors influence each other, leading to a deeper understanding of the interplay between work-family conflict and job stress.
6. Complexity Acknowledgment: The model acknowledges the complexity of work-family life in the given context, recognizing that it is not feasible to include all potential factors within a single model. Hence, the model focuses on specific essential antecedents and outcome variables that are most relevant to the particular analysis.

In conclusion, the model's boundary provides a framework to analyze work-family conflict and job stress, allowing for a comprehensive examination of the dynamics and relationships between different variables within the context being studied. It offers valuable insights into how work and family domains interact and impact each other in the given scenario.

3.3. Types Of Hypotheses

In this section, important hypotheses are stated that form the backbone of our model and shed light on the complex dynamics of work-family conflict and its impact on employees in the construction industry. These hypotheses are carefully constructed based on previous research and aim to provide valuable insights into the relationships between various variables that help us understand the complexities of work-family life. Hypothesis 1 forms the cornerstone of our model, stating that job involvement and job strain from the work domain play an important role in shaping work-family conflict (WFC). It predicted a positive interaction between job involvement and work conflict, known as work interference with family conflict (WIFC), which means that higher levels of job involvement may contribute to increased WIFC. In addition, this hypothesis shows that family interference and family pressure from the family sphere also play a key role in work-family conflict (WIFC). Based on the first hypothesis, hypothesis 2 is of particular importance because it clarifies the influence of individual characteristics that are formed based on values and beliefs on work-family conflict. In this study, it is assumed that employees believe in collectivist values and prioritize their jobs, which leads to higher initial levels of job satisfaction compared to family satisfaction. This insight allows us to understand the differential impact of work and family domains on employee satisfaction, which has important implications for their overall well-being and performance.

Hypothesis 3 examines the complex relationship between work-family conflict and satisfaction. By examining the correlations between WIFC and family satisfaction, as well as FIWC and job satisfaction, valuable insights into the emotional consequences of work-family conflict can be gained. This hypothesis suggests a negative correlation between WIFC and family satisfaction, suggesting that higher levels of WIFC may be associated with lower family satisfaction. Similarly, FIWC is expected to be negatively correlated with job satisfaction, meaning that higher levels of FIWC can lead to lower job satisfaction.

For a comprehensive understanding of our model of work-family dynamics, Hypothesis 4 highlights the relationships between job satisfaction and performance, as well as family satisfaction and performance. In this section, it is assumed that job satisfaction has a positive effect on job performance and job participation,

and it shows the importance of employee satisfaction in the results related to their jobs. Furthermore, the hypothesis suggests that family satisfaction is positively related to family functioning and family involvement, highlighting the importance of family domain satisfaction for overall family functioning. Finally, hypothesis 5 reveals the interaction between job involvement, job performance, and job strain. By examining the relationship between these variables, we gain deeper insight into how job involvement affects job performance and the potential trade-off with job strain. Similarly, in these stated hypotheses, we examine the relationships between family involvement, family functioning, and family stress and clarify the complex connections within the family domain. This text develops basic hypotheses to analyze the dynamics and consequences of work-family conflict. The purpose of carefully examining these hypotheses is to contribute valuable knowledge to promote work-life balance and improve employee well-being and performance in the construction industry (Wu et al., 2016).

3.4. Subsystem Diagram and Model's Boundary Table

A subsystem diagram provides a concise visual overview of a complex system and breaks it down into interconnected subsystems. It shows the key components and their interactions and helps stakeholders understand the structure of the system and facilitate decision-making. This valuable tool provides insights into system performance and potential areas for improvement. In Figure_4, the subsystem diagram of the reviewed model can be seen.

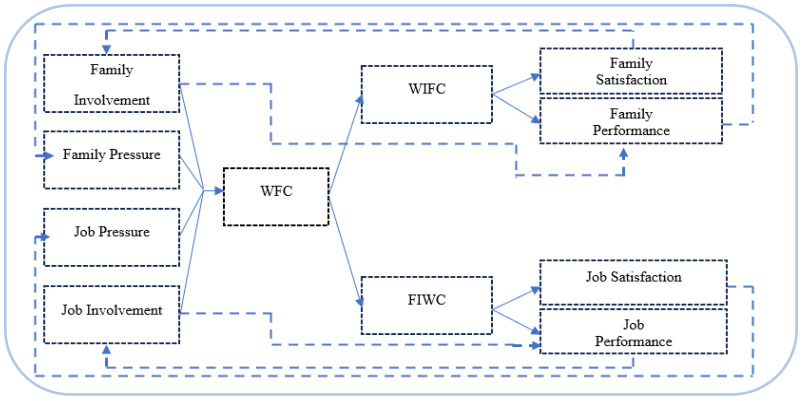


Fig 4. Subsystem diagram of two-way WFC dynamic model (Wu et al.,2016)

3.5. Causal-Loop Diagram

To analyze system dynamics problems, we need to understand cause and effect diagrams. With the help of these diagrams, these diagrams can be connected to the flow diagrams and mathematical equations, and using the simulation method, the obtained mathematical model can be used as a basis for analyzing the behavior and analysis of the system. Figures_5 and_6 show the cause and effect loops of the respective model in two separate and complete ways.

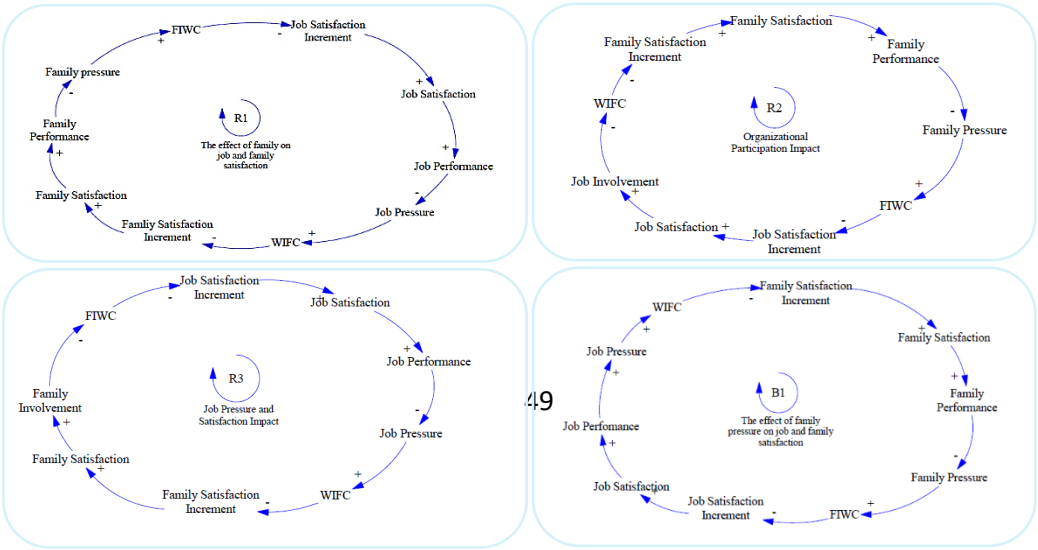


Fig 5. Cause and effect loops separately

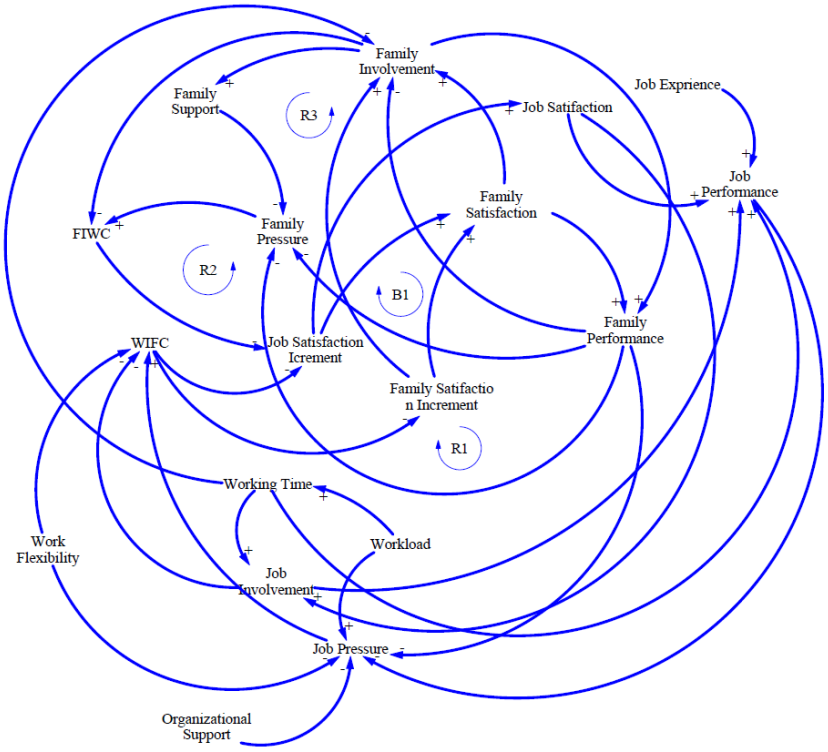


Fig 6. The cause and effect loop of the model in general

3.6. Stock-Flow Map

Causality diagrams emphasize feedback structures, while inventory-flow maps emphasize physical flow, and for this reason, the WFC evolution system flow diagram of the construction industry employee is depicted and can be seen in Figure_7. As shown in Table_2, there are 18 variables in the system:

• Two state variables (job satisfaction and family satisfaction)

• Two rate variables (increasing job satisfaction and increasing family satisfaction)

• Thirteen auxiliary variables (family support, family pressure, family involvement, job experience, job performance, family performance, workload, work time, job conflict, job pressure, organizational support, WIFC, and FIWC)

• A constant (work flexibility)

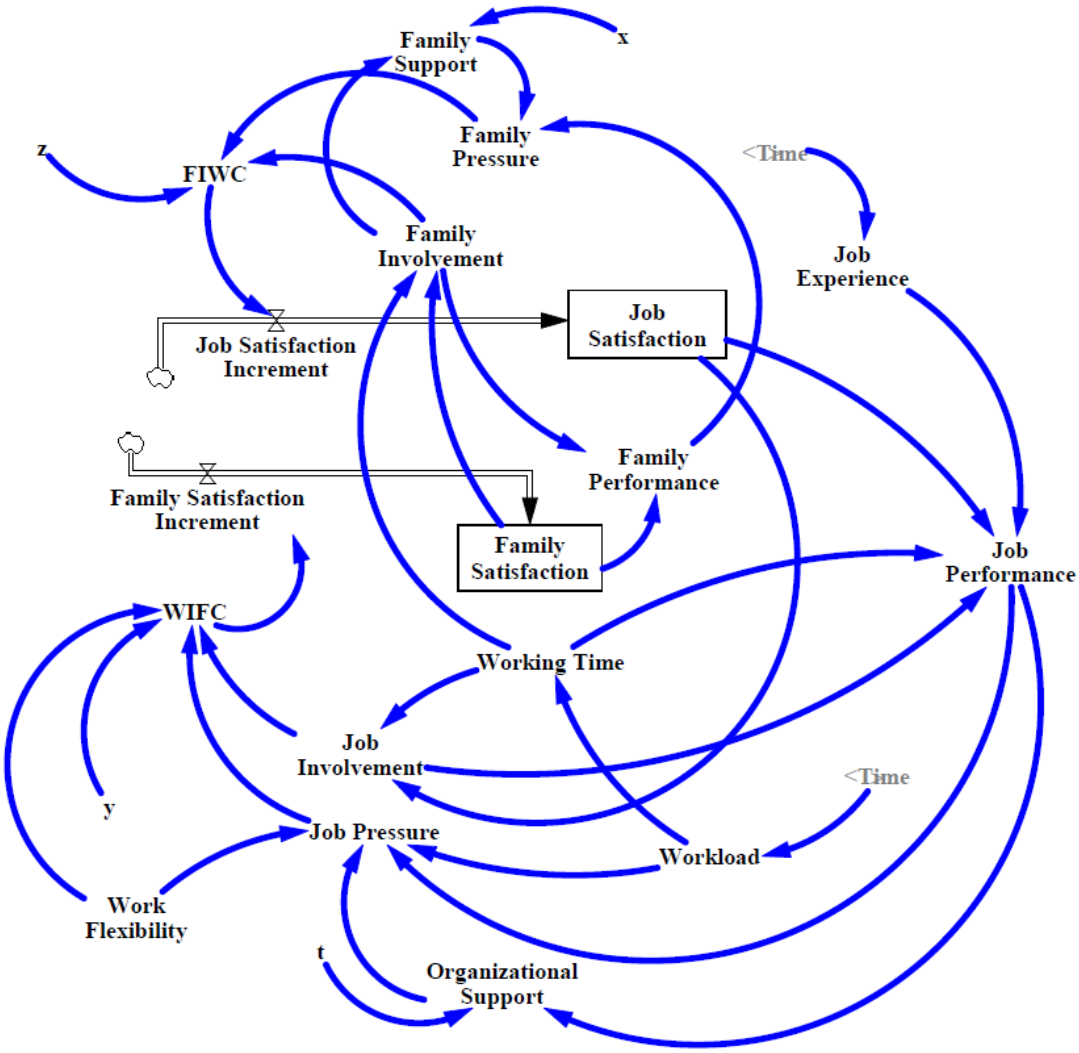


Fig 7. State and flow diagram of the model

3.7. Formulization And Types Of Variables

The research process included a relatively complete review of existing literature and consultation with experts to identify relationships between variables. These relationships were then formulated into mathematical formulas to create a simulation model. Table_1 presents the detailed formulation of these relationships and shows how the variables interact and influence each other. The graphic representation of these relationships is shown in Figure_6, which was produced using the output of Vensim software. This integration of literature, expert insights, mathematical formulation, and software output ensures a comprehensive and robust understanding of the complex system under study. In these equations, there are two qualitative variables of work flexibility and job experience, because we have investigated a specific industry (construction industry) in this study, we have considered the variable of work flexibility with a constant value of 1, and Such job experience variable, which was the second qualitative variable, was created using the Lookup function and converted into quantitative variables. This model has been run in the Vensim PLE software and the simulation time was set to be 36 months.

Table 2. Type of variables along with the formulas used

Row	Variable name	Variable type	Formula
1	FIWC	Auxiliary	0.05*Family Involvement*Family Pressure
2	Family Support	Auxiliary	Family Involvement*0.1
3	Family Pressure	Auxiliary	(Family Support*Family Performance)/1
4	Job Experience	Auxiliary	Time
5	Family Involvement	Auxiliary	(Family Satisfaction/Working Time)*100
6	Job Satisfaction Increment	Rate	FIWC
7	Job Satisfaction	State	(Job Satisfaction Increment)
8	Job Performance	Auxiliary	Working Time*Job Experience*Job Involvement*DELAY1I(Job Satisfaction,1,5)/10
9	Family Performance	Auxiliary	DELAY1I(Family Satisfaction,1,1.5)*Family Involvement/10
10	Family Satisfaction Increment	Rate	WIFC
11	Workload	Auxiliary	Time
12	Working Time	Auxiliary	Workload
13	Job Involvement	Auxiliary	Job Satisfaction*Working Time
14	WIFC	Auxiliary	0.05*Job Involvement*Job Pressure/Work Flexibility
15	Job Pressure	Auxiliary	Workload/(Job Performance*Organizational Support*Work Flexibility)
16	Organizational Support	Auxiliary	Job Performance*0.1
17	Work Flexibility	Fixed	1
18	Family Satisfaction	State	Family Satisfaction Increment

4. Model Simulation And Result Analysis

Validation tests can be used to ensure the validity of the model. Accuracy of simulation results A validation test can confirm whether the responses of the simulated system represent reasonable and correct changes in the real system. Also, analyzing the model and examining different policies can help to better understand the problems that need to be analyzed and provide suitable solutions for improvement.

4.1. Model Testing And Validation

To ensure the validity of the research model, the model structure validity test, the dimensional consistency validity test, and the model limit condition test have been used.

4.1.1. Validity Test Of The Model Structure

The structure evaluation test means the compatibility of the model's behavior with its structure. This issue requires that in the simulated model, the behavior of the variables in positive and negative feedback should be exponential and objective respectively. Accordingly, In Figure_8, as seen in the diagram, the model is correct in terms of mathematical structure and equations.

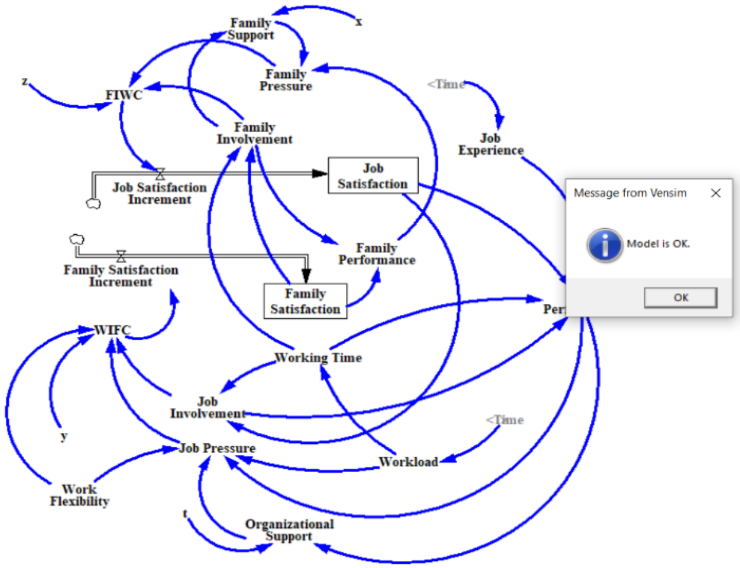


Fig 8. The test of the accuracy of the structure for the model

4.1.2. Validity Test Of The Dimensional Consistency

In this test, it examines the right and left sides of each equation in terms of dimensions and units of variables, which must be the same. In this unit test, the variables should be selected close to their physical meaning in the real world and have a close relationship with a meaningful concept in the real world. As shown In Figure_9, the created model is correct in terms of dimension structure and variable unit.

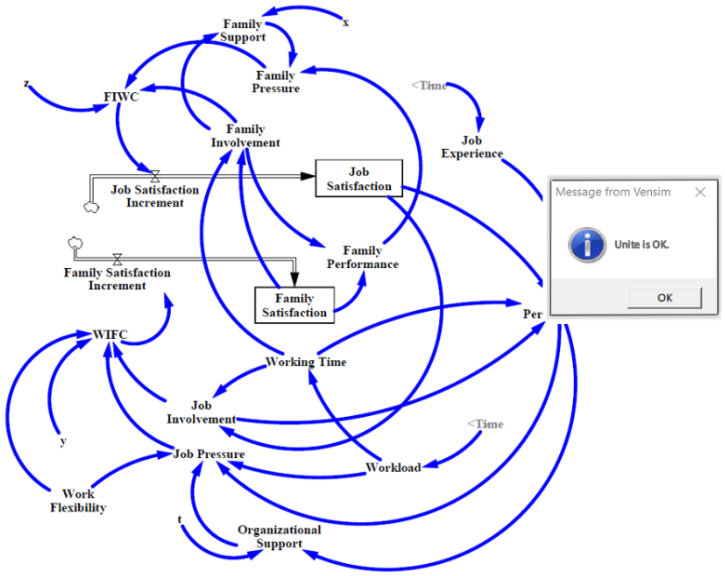


Fig 9. Dimensional compatibility test for the model

4.1.3. Limit Condition Test Of The Model

This section examines and tests the boundary conditions of the model. The limit behavior of the model is checked at the lowest level of work-family interference, and the important question is that if the effect of work-family interference is equal to 0 (it becomes ineffective), what will happen to the variable of family satisfaction At first, the work-family interference variable, which had an impact factor percentage of 0.05, has an impact factor of 0.001, which means almost no impact, and as seen in Figure_9, it is expected that the family satisfaction variable will remain at a constant value throughout the period. arrive early

In the second part, the limited behavior of the model is examined in a situation where family involvement in work affairs is not taken into account, and the important question is, if family involvement in work affairs is not taken into account, what will happen to the job satisfaction variable? In this section, the level of job satisfaction was dependent on the work-family interference variable, and we check that if the level of family involvement in work matters, as shown in Figure_10, is considered ineffective, job satisfaction should not grow and at the level of its original remains.

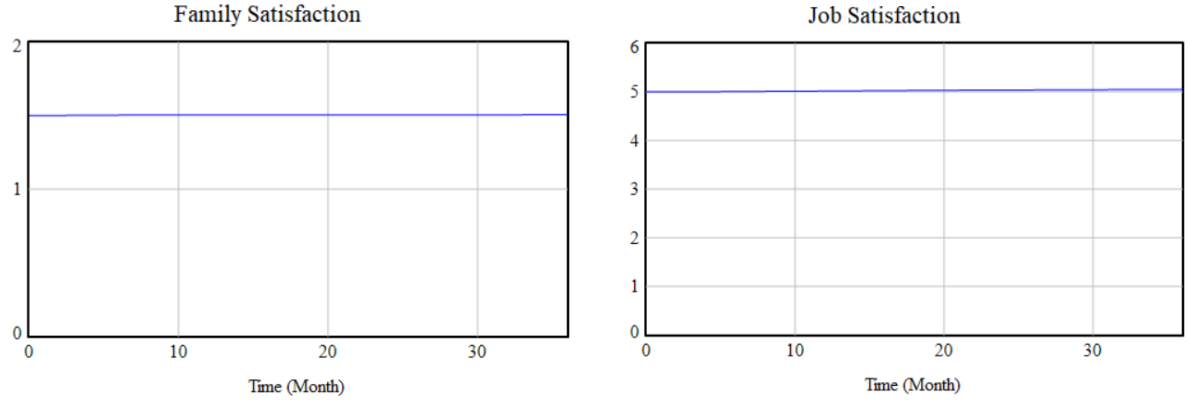
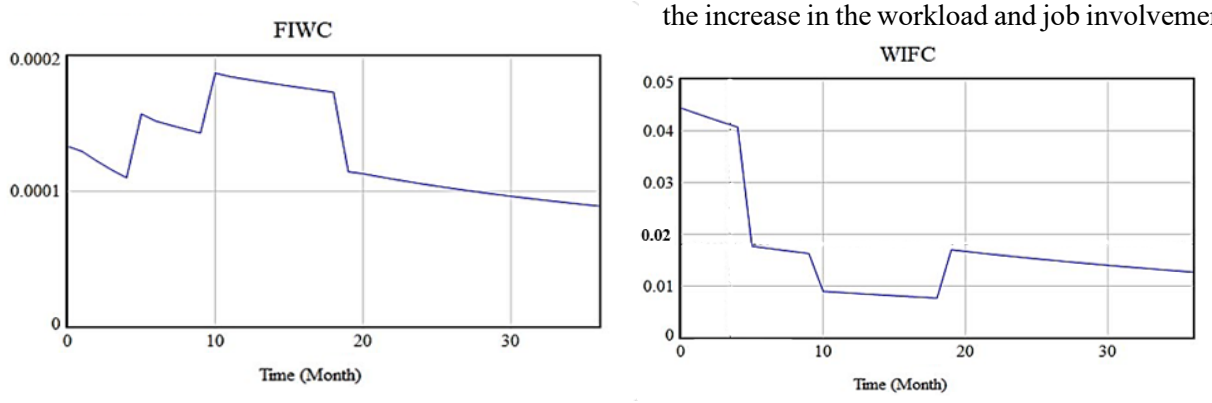


Fig 10. The results of the accuracy test of the model structure

4.2. Model Outputs

The simulation results obtained under the given parameters in the context of the construction industry are discussed in this section. Figure_11 shows that employees experience higher levels of work-family conflict (WIFC) compared to family-work conflict (FIWC) during the construction project life cycle. This disparity is attributed to the distinct role of work and family in an employee's life, and the contribution of work to family is more important under the influence of collectivist values. From the decision stage to the design stage and the first stage of the construction stage, FIWC shows an upward trend. This trend is explained by the increase in the workload and job involvement



of employees with the progress of the project, which leads to a decrease in family participation and, as a result, an increase in family involvement in work conflicts. On the other hand, WIFC shows a downward trend in the decision stage, the design stage, and the first stage of the construction stage. This reduction is due to the increase in job experience and working time of employees, which leads to improved job performance, reduced job pressure, and increased organizational support, at least to some extent. However, in the second phase of the construction phase, WIFC experienced a comeback (Wu et al., 2016). This return is caused by the decrease in the job performance of employees at this stage, which leads to an increase in work interference with family conflicts. Overall, these simulation results shed light on the dynamic nature of work-family conflict in the construction industry and how it evolves at different project stages. It shows the complex interplay between job performance, job involvement, family involvement, and job strain and how these factors affect the levels of work-family interference experienced by employees.

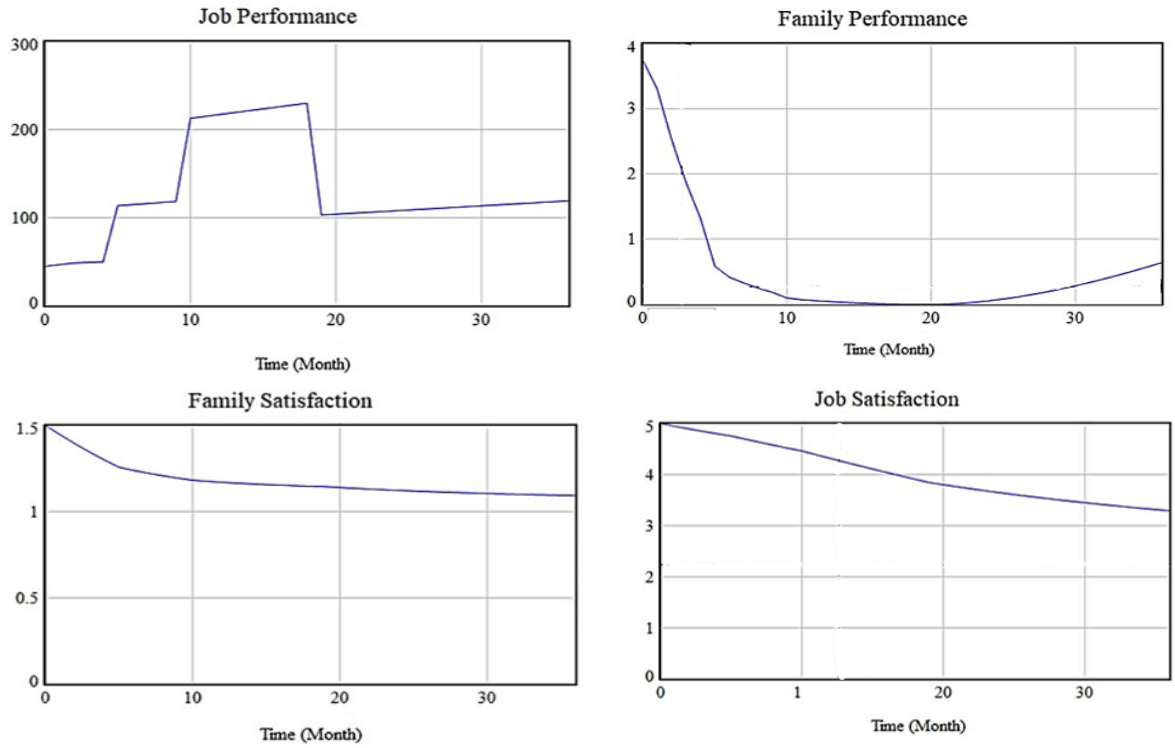


Fig 11. Simulation outputs

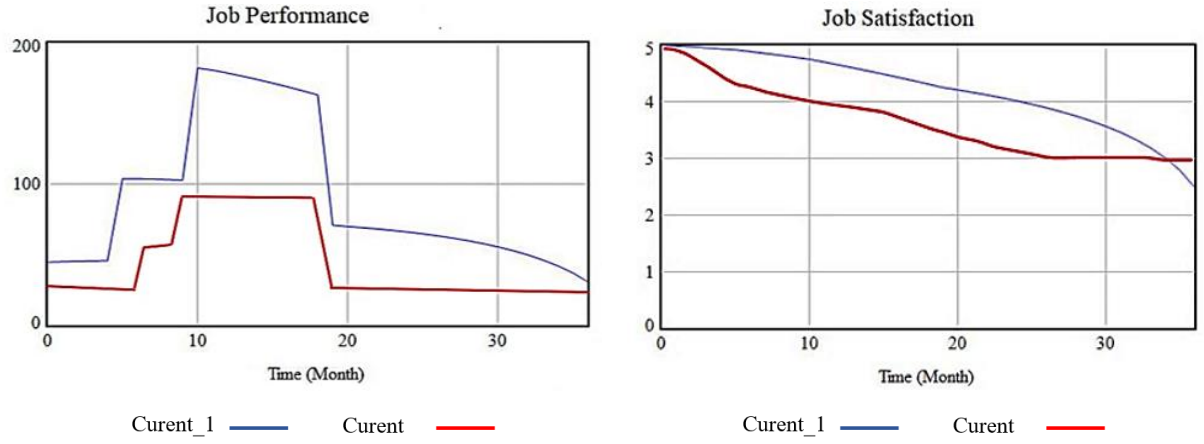
During the simulation time of the project, it was observed that WIFC has a greater direct effect on family satisfaction, while FIWC has a greater effect on job satisfaction [45]. This shows that employees have more conflict between work and family life, and overall family satisfaction affects them more than their job satisfaction. This simulation shows the downward trend in WIFC over time. This reduction can be attributed to the influence of collectivist values, which emphasize the importance of family and may lead to improved job performance and increased organizational support, reduced job pressure, and WIFC levels during different phases of the project. On the other hand, FIWC remains relatively stable or shows a slight increase during the project duration. This trend is probably related to the increase in workload and job involvement of employees during the progress of the project, which negatively affects family participation and satisfaction. When comparing work and family performance during the project, it is observed that work performance is closely related to time and work experience. As job experience increases, job performance

generally improves. However, family functioning is significantly lower in the early stages of the project due to the combined effect of reduced family involvement and lower family satisfaction. This reduction in family functioning is due to employees prioritizing work over family, as indicated by higher levels of experienced WIFC. In summary, the simulation highlights the importance of work-family conflict in the context of collectivist values. This emphasizes the importance of understanding the dynamics between WIFC, FIWC, family satisfaction, and job satisfaction and their impact on job and family performance over time. These insights are essential for organizations in the construction industry to devise strategies that promote a healthy work-family balance and enhance employee well-being and performance.

4.3. Assessing Policies And Scenarios

In this part, the focus is on determining the effect of different parameters on job satisfaction, family satisfaction, job performance, and family performance in the model. To achieve this goal, researchers conducted experiments by changing the values of certain variables in the model and then comparing the resulting outputs. The three parameters selected for modification in the study are work flexibility, organizational support, and family support. By adjusting these parameters, the researchers sought to understand how changes in these factors affect the overall results of the model. This process involved running the model with different values for work flexibility, organizational support, and family support and then analyzing the respective results. By comparing the outputs of the model under variable values of the parameters, researchers can identify the relationships between these parameters and job satisfaction, family satisfaction, job performance, and family performance.

The first scenario explores how altering the work flexibility parameter impacts job satisfaction, family satisfaction, job performance, and family performance within the model. The objective is to understand the relationship between the work flexibility parameter and the four variables mentioned. The baseline value of the work flexibility parameter is set at 1 in the initial plan while keeping other model parameters constant. In the Current_1 plan, the work flexibility parameter is increased to 3. By conducting simulations and comparing the results displayed in Figure_12, can observe the effects of varying work flexibility on the mentioned variables.



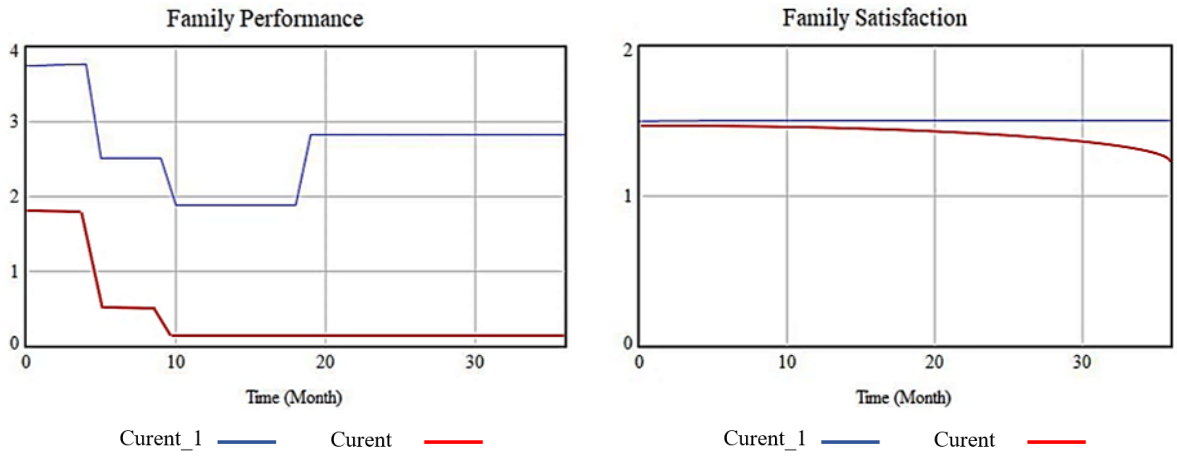
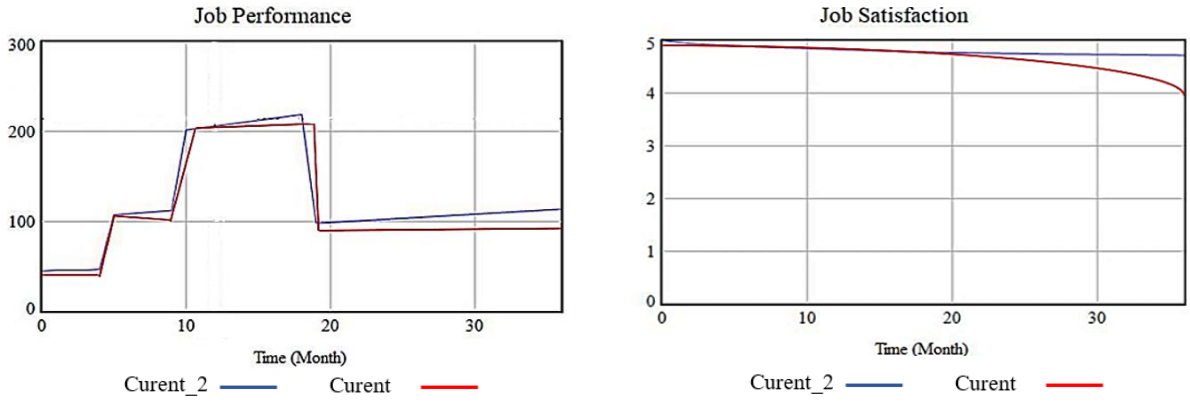


Fig 12. The results of changing the work flexibility parameter on four variables

A comparison of the results between Current_1 and Current in Figure_11 reveals that increased work flexibility positively influences both employee job satisfaction and family satisfaction in the simulation. Moreover, job performance and family performance also demonstrate significant improvement, alongside enhanced family functioning. This finding highlights the clear correlation between improved work flexibility and its positive effects on employee satisfaction and performance. The main reason behind these outcomes lies in the reduction of job pressure and work interference with family conflict (WIFC) when work flexibility increases. This, in turn, leads to an escalation in family satisfaction and involvement, consequently enhancing family functioning. Reduced family pressure follows suit, resulting in a decline in family interference with work conflict (FIWC). Consequently, job satisfaction and job performance improve.

In the second scenario, the family support parameter is changed by using the family support variable of the model, which in the current main program, the relationship of the family support function is: family support = Family participation × 1.0. All other parameters remain unchanged and in Current_2 the relationship of family support changes with family support = family participation × 3.0. The simulation results show how this adjustment affects key variables such as family satisfaction, job satisfaction, family performance, and job performance, and organizations can use this knowledge to optimize their family support policies and ultimately employee well-being, job satisfaction, and increase overall. In Figure_13, we can see the effects of changing family support on the mentioned variables.



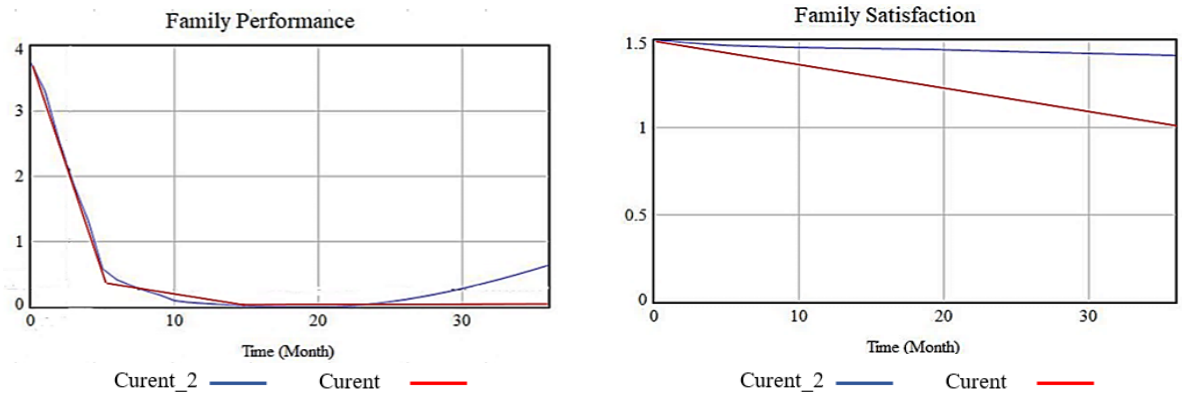


Fig 13. The results of changing the family support parameter on four variables

When the responsiveness of family support to family participation improves, it has a limited impact on family satisfaction and family performance, particularly among construction industry workers. However, there is a noticeable improvement in job satisfaction and job performance, although job performance shows a relatively smaller enhancement compared to job satisfaction. This suggests that increased family support can positively influence job satisfaction and job performance to some extent. Over time, the effect of increased family support on employee satisfaction and performance in the family domain becomes less significant. This is because the direct reduction in family pressure, resulting from changes in the family support-performance relationship, leads to a decrease in family interference with work conflict (FIWC). As a consequence, job satisfaction and job performance also improve. The relatively modest improvement in job performance is attributed to the fact that family support indirectly affects job performance through its influence on job satisfaction. Family pressure cannot directly impact family satisfaction and family functioning. Similarly, job satisfaction and job performance indirectly affect family satisfaction and family functioning through factors such as job involvement, job pressure, and organizational support. Given the involvement of several parameters in this pathway, family satisfaction, and family performance show minimal changes.

In the current main program, the relationship between organizational support and job performance is shown as organizational support = job performance × 0.1. While all other parameters in the model remain constant only the relationship between organizational support and job performance in the Current_3 plan changes to organizational support = job performance × 0.3. This change represents an increase in the degree of responsiveness of organizational support to job performance improvement, as the value is now tripled compared to the original current plan. Then the simulation is done with these adjusted parameters and the results are shown in Figure_14. The simulation results from the third scenario provide fundamental insights into how increasing the organizational support parameter affects different variables in the model. This issue clarifies the impact of this adjustment on aspects such as job satisfaction, family satisfaction, job performance, and family performance. This scenario helps to understand the importance of organizational support in the model and its impact on the interactions between work performance and organizational support. The findings can be valuable to organizations seeking to optimize their support policies and lead to improved employee well-being, job satisfaction, and overall performance.

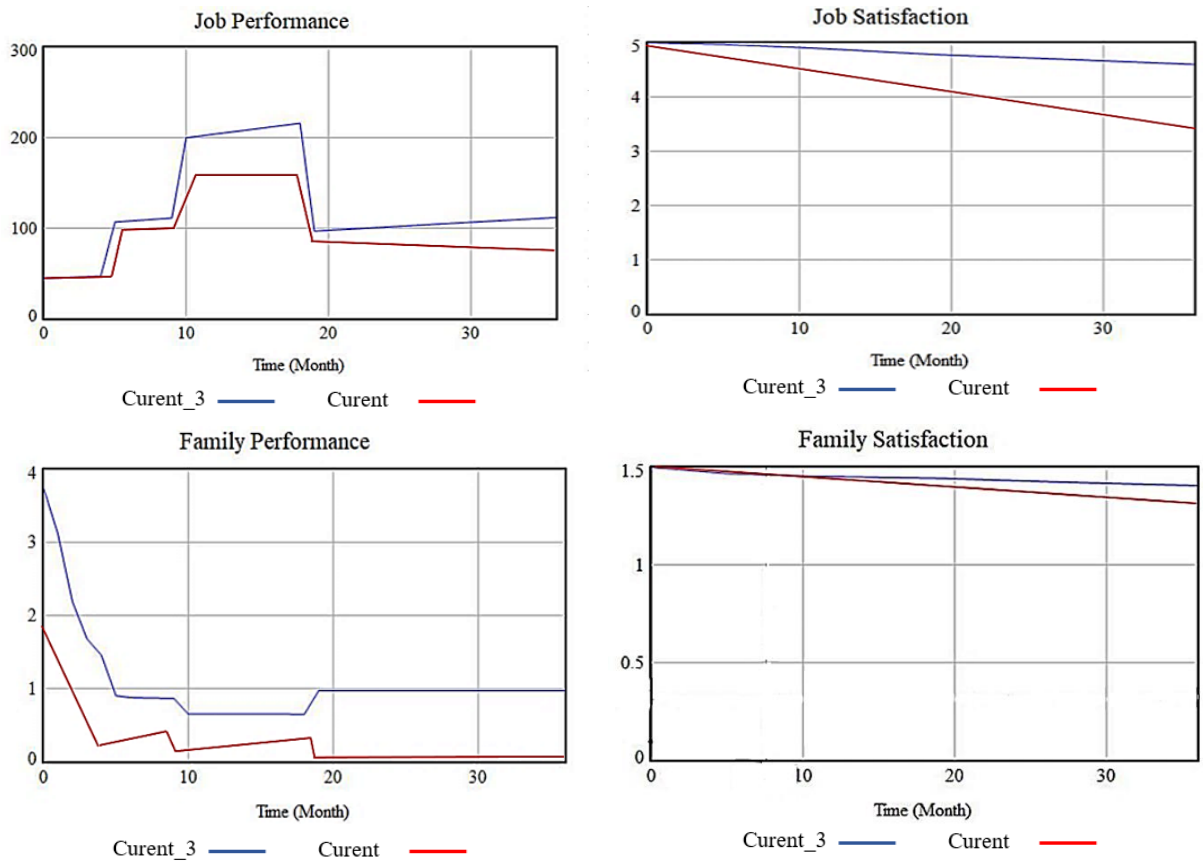


Fig 14. The results of changing the organizational support parameter on four variables

4.4. Management insights

4.4.1. Management recommendations for creating work flexibility

Implementing flexible work arrangements is crucial for alleviating stress among construction workers (public et al., 2023). Organizations can support their workforce by providing options like remote work or flexible schedules, identified through feedback sessions for continual improvement. Such strategies foster employee retention and effectiveness (Assmann & Minde, 2023), enabling a better work-life balance and heightened satisfaction in both job and family spheres. Monitoring job pressure levels is essential, influencing overall employee contentment (Bunjak et al., 2023). Increased work flexibility mitigates job strain and work interference with family conflicts (WIFC), enhancing satisfaction and family involvement while reducing family pressure, ultimately boosting job performance and satisfaction. Emphasizing work-life balance is vital in organizational practices (Duan et al., 2023). Encouraging personal life prioritization alongside work duties through flexible hours and family support resources fosters a culture of balance. Leveraging digital tools further aids coordination, fostering improved work-life harmony and job performance.

4.4.2. Management recommendations for creating family support for employees

Improving family support for employees is foundational in indirectly boosting job satisfaction and performance (Ahmed et al., 2023). Organizations achieve this by offering family care resources, flexible schedules, and fostering a work culture valuing work-life balance. Statistical analysis highlights the

correlation between highly supportive family environments and the performance of high-achieving employees, shaping their work-life equilibrium and mutual responsibility. Simultaneously, monitoring family pressure levels and work-family interference is crucial (Ahmed et al., 2023). Enhanced family support directly alleviates family pressure, reducing conflicts between work and family domains, and thereby elevating job satisfaction and performance. Understanding the intricate influence path among family support, job satisfaction, performance, and family contentment is paramount. Organizations should analyze the relationship between family support, job satisfaction, job performance, family satisfaction, and family performance. This analysis can be done through surveys or feedback sessions to determine which types of support and resources are most effective in increasing employee satisfaction and performance in both work and family aspects. Understanding this pathway of influence can guide organizations in implementing targeted strategies to support the well-being and overall performance of their employees.

4.4.3. Management recommendations to create organizational support for employees

Improving organizational support is fundamental, nurturing a caring work environment through aid for personal and professional development, a positive workplace culture, and resources for work-life balance (Aldabbas et al., 2023). Such efforts elevate employee value and support, correlating with heightened job satisfaction and performance, as evidenced by research demonstrating the impact of perceived organizational support on work engagement and creativity (Aldabbas et al., 2023). Concurrently, monitoring work pressure and its interference with family life remains crucial, as stress and work pressure significantly influence employee performance, especially concerning work interference with family conflicts (WIFC). Increased organizational support mitigates job pressure, positively impacting family satisfaction and performance, thus enhancing overall job satisfaction and performance (Rijanto, 2023). Focusing on family involvement through resources for family care and promoting work-life balance reduces family stress, subsequently enhancing job satisfaction and performance. Analyzing organizational support's impact through surveys and feedback sessions guides tailored support strategies for maximal positive outcomes in both professional and familial domains.

5. Conclusions

The work-family conflict is a topic of increasing importance in the fields of management and psychology. Scholars primarily use quantitative research methods like questionnaire surveys to study this issue. A dynamic model framework was developed for work-family conflict in the construction industry using system dynamics. The model considers key factors that influence work-family conflict. Simulation results showed that employees with collective values experience more work interference with family conflict (WIFC) than family interference with work conflict (FIWC). Improving work flexibility and organizational support positively impacts employee satisfaction and performance in both work and family domains, while enhancing family support significantly increases job satisfaction. To apply these findings, organizations can offer flexible work plans and improve the organizational climate. Additionally, family members can enhance employee satisfaction by providing better family support. However, the model has limitations, as it cannot include all relevant variables due to the complexity of work-family conflict. In future research on work-family conflict, exploring stress-related outcomes beyond job and family satisfaction, such as mental health indicators and burnout, is crucial for a comprehensive understanding. Broadening the scope by considering additional variables like cultural influences, coping mechanisms, and social support systems can enrich the model and elucidate the conflict's complexities. Complementing quantitative surveys with qualitative methods like case studies and content analysis allows for a deeper exploration of individual experiences and coping strategies. Expanding the investigation beyond traditional work and family domains to include social relationships, hobbies, and community involvement can provide a holistic view of work-

life balance. Additionally, conducting longitudinal studies and comparative analyses across industries or cultures can illuminate the dynamic nature of work-family conflict and its contextual variations.

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