Impact of Scope Creep and Process Conflict on Project Success: Moderating Role of Building Information Modelling (BIM)

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Abstract

This study examines the impact of scope creep and process conflict on construction project success in Pakistan, with a specific focus on the moderating role of Building Information Modelling (BIM). Scope creep, characterized by the uncontrolled expansion of a project's scope, often leads to delays, budget overruns, and diminished quality, while process conflict arises from disagreements among stakeholders regarding project procedures, resulting in inefficiencies and delays. These issues are particularly prevalent in large-scale construction projects, exacerbated by ambiguous project specifications, inadequate communication, and external factors such as political instability. This research emphasizes how BIM, a digital technology that integrates real-time updates, enhances coordination, and fosters collaboration, can effectively mitigate these challenges. BIM enables stakeholders to track scope changes, resolve conflicts, and improve decision-making, contributing to the overall success of construction projects. The study finds that BIM significantly moderates the relationship between scope creep and process conflict, leading to improved project outcomes. This research provides valuable insights into the role of BIM in construction project management, offering practical recommendations for improving project success through better scope management, conflict resolution, and stakeholder collaboration. The findings underscore BIM's potential to revolutionize construction practices and enhance the efficiency of large-scale projects in Pakistan.

Keywords: Process Conflict, Scope Creep, BIM, Project Success.

Introduction

The construction sector in Pakistan plays a crucial role in driving the country's economic development, with a notable impact on its GDP. This industry not only aids in developing vital infrastructure but also generates employment and supports the growth of related sectors such as cement, steel, and transportation. The sector is instrumental in shaping the nation's infrastructure, improving transportation systems, fostering industrial growth, and boosting connectivity. A prime example of this is the China-Pakistan Economic Corridor (CPEC), a $62 billion project aimed at transforming Pakistan's infrastructure through the construction of highways, railways, and energy pipelines (Jamil & Alam, 2020). Other significant projects, such as the expansion of the national motorway network, the development of metro rail systems in Lahore and Karachi, and the modernization of airports, are essential to enhancing both urban and rural infrastructure in the country (Government of Pakistan, 2021). While these developments are crucial, they also highlight the complex challenges associated with managing

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large-scale and multifaceted construction projects. Given the scale and importance of these projects, addressing the inefficiencies and risks involved in their management becomes crucial to ensure that they meet their objectives on time and within budget.

A significant challenge prevalent in large-scale construction projects is scope creep, which refers to the uncontrolled expansion of a project's scope without commensurate adjustments to its timeline, budget, or resources. In the context of construction, scope creep often arises from ambiguous project specifications, unauthorized modifications, or a lack of clear objectives. This issue can lead to considerable delays, budgetary overruns, and a deterioration in the overall quality of the final deliverable. Scope creep is one of the primary reasons for project delays and failures, making it essential to explore solutions that can help mitigate its effects, ensuring the timely and cost-effective completion of construction projects. Within Pakistan, the complexity of managing major infrastructure projects is further exacerbated by insufficient pre-project planning, communication breakdowns among stakeholders, and external factors such as political instability and regulatory changes. These elements contribute to the continual modification of the project scope, thereby escalating costs and extending project timelines (Baig & Kureshi, 2018). Empirical studies have consistently identified scope creep as a primary cause of project failure, particularly when a formalized change management process is absent (Hughes et al., 2023). Addressing this challenge is vital for the success of future construction projects, and this study focuses on evaluating BIM's potential in managing scope creep more effectively.

Process conflict is another significant challenge within the construction industry, occurring when disagreements arise among stakeholders regarding the execution of tasks and the allocation of responsibilities. These conflicts typically stem from differences in perspectives on project timelines, resource distribution, and the roles of various parties involved. Miscommunications or mismatched expectations between clients, contractors, and project teams often result in delays, inefficiencies, and heightened tensions that hinder the progression of a project. In Pakistan's construction sector, process conflict is particularly prevalent in large-scale projects involving numerous stakeholders, as the industry frequently faces issues such as inadequate communication, ambiguous role definitions, and competing priorities (Abbasi et al., 2023). The impact of process conflict on project success makes it imperative to find mechanisms to reduce such conflicts, and BIM could provide a practical solution to this problem. Such conflicts can critically impair decision-making efficiency, causing delays in project approvals, disputes over task execution, and a lack of coordination among teams. As the construction industry in Pakistan continues to expand, effectively managing and mitigating process conflicts will be essential to ensuring the timely completion, budget adherence, and overall quality of projects. This study aims to evaluate how BIM can foster better collaboration, reduce misunderstandings, and address process conflicts, leading to more efficient project execution.

Building Information Modelling (BIM) has emerged as an effective solution to address several challenges in the construction industry. BIM is a digital technology that facilitates the creation of integrated, comprehensive models of construction projects, promoting enhanced coordination, collaboration, and communication among stakeholders. By enabling real-time data sharing, BIM allows for efficient tracking of project scope changes, monitoring of progress, and early identification of potential conflicts throughout the project lifecycle. In Pakistan, the adoption of BIM has gained momentum, especially in large-scale infrastructure projects, as it aids in streamlining the construction process and enhancing overall project management (Khan & Kureshi, 2023). BIM's growing adoption underscores its potential to revolutionize project management practices in the construction sector, offering significant opportunities to address long-standing issues such as scope creep and process conflict. BIM holds considerable potential for mitigating scope creep by offering a clear, visual representation

of the project scope, enabling stakeholders to monitor changes and approve modifications in real time. Furthermore, BIM fosters collaboration by providing a centralized platform for stakeholders to communicate effectively, thereby reducing misunderstandings and preventing process conflicts (Azhar, 2020). Through features such as clash detection, real-time updates, and improved project visualization, BIM plays a crucial role in addressing both scope creep and process conflict, ultimately contributing to the successful delivery of construction projects. Therefore, this study is important as it explores the role of BIM in addressing these interrelated challenges, thereby improving project outcomes and overall sector efficiency.

Despite its potential, there is limited research on the role of BIM as a moderating factor between scope creep, process conflict, and project success in the construction sector, particularly in Pakistan. While BIM has been studied for its impact on project outcomes, its role in managing the interrelated challenges of scope creep and process conflict has not been thoroughly examined. This gap in research highlights the importance of this study, which seeks to expand the body of knowledge on BIM by examining its potential as a moderating tool to enhance construction project success. This study aims to address this gap by examining how BIM can act as a moderating factor to mitigate the negative effects of these challenges on project success in Pakistan's construction industry. By exploring the potential of BIM to improve project management practices, this research aims to contribute to the growing body of knowledge on BIM's role in enhancing the efficiency and effectiveness of construction projects. As such, this research holds significant practical value for the construction industry, offering potential solutions to some of its most persistent challenges.

In summary, this research will focus on assessing the impact of scope creep and process conflict on construction project success and will evaluate how BIM can be leveraged to address these challenges. By providing insights into the moderating role of BIM, this study aims to offer practical recommendations for integrating BIM into project management practices to improve the outcomes of construction projects in Pakistan. The findings of this study could serve as a foundation for future research and guide industry stakeholders toward adopting more effective tools and strategies in project management.

Literature Review

Scope Creep

Scope creep is a prevalent and significant challenge faced by project managers, particularly in large-scale construction projects. It occurs when the project's scope expands beyond the original plan without proper adjustments to the project's timeline, resources, or budget. Scope creep often results from ambiguously defined project objectives, inadequate communication, and unapproved modifications, which are typically not documented or properly managed. According to Ajmal et al. (2022), the causes of scope creep are multi-faceted, ranging from unclear project specifications to lack of effective change control processes.

The intensity of this issue is underscored by its substantial negative impact on project outcomes. Scope creep can lead to significant delays, budget overruns, and a deterioration in the overall quality of the deliverable. In large-scale infrastructure projects, the prevalence of scope changes is a common occurrence, and if not effectively controlled, it can result in projects deviating from their original goals, thus hindering progress. As noted by Ahmed and Jawad (2022), the absence of a formalized change management process often exacerbates the issue, contributing to uncontrolled scope expansion that undermines project efficiency.

Furthermore, the complexity of managing scope creep is heightened in large projects, where multiple stakeholders are involved, each with their own expectations and objectives. When scope changes are not properly documented or approved, it leads to a misalignment between stakeholders, causing further delays and resource inefficiencies. This, in turn, escalates project costs and extends timelines, ultimately affecting the project's success.

The empirical evidence highlights scope creep as one of the leading causes of project failure, particularly in the absence of a structured approach to scope management (Baig & Kureshi, 2018). In order to mitigate the negative effects of scope creep, it is crucial for project managers to implement robust change control procedures and ensure that all modifications to the scope are well-documented, communicated, and approved by relevant stakeholders. Without such measures, the risk of scope creep undermining the success of large-scale projects remains high, emphasizing the need for effective scope management strategies.

Process Conflict

Process conflict is another critical challenge encountered in construction projects, particularly in large-scale undertakings that involve multiple stakeholders. This type of conflict arises when there are disagreements among stakeholders regarding the methods, procedures, or roles associated with achieving project objectives. These disagreements often stem from differing perspectives on project timelines, resource allocation, and the distribution of responsibilities, resulting in significant inefficiencies. According to Li et al. (2021), process conflict can lead to delays, miscommunications, and a breakdown in collaboration, which ultimately hinders project progress.

The intensity of process conflict lies in its disruptive impact on decision-making, resource allocation, and project execution. When stakeholders, such as clients, contractors, and project teams, do not align on key processes or procedures, it creates an environment of tension and confusion. These misalignments slow down decision-making, increase the risk of errors, and prolong project timelines. As highlighted by Amoah et al. (2024), process conflict can escalate when team members lack proper communication tools or when roles and responsibilities are poorly defined, exacerbating delays and inefficiencies.

The severity of this issue is particularly pronounced in large-scale projects, were diverse teams with varied expertise work together. In such projects, miscommunication or mismatched expectations between stakeholders can lead to critical delays and an overall reduction in productivity. This misalignment can have far-reaching consequences, as it impacts not only the immediate project timeline but also the quality of the final deliverable. According to Bhonde et al. (2023), the absence of a coordinated approach to task allocation and process execution further exacerbates the problem, leading to inefficiencies that reduce overall project performance.

The potential for process conflict to negatively impact project success underscores the need for effective conflict resolution strategies and enhanced collaboration among stakeholders. By employing collaborative tools like Building Information Modelling (BIM), stakeholders can ensure that all parties are aligned on project procedures and roles. BIM's ability to centralize information and improve communication has been shown to reduce misunderstandings and facilitate the resolution of process conflicts (Azhar, 2020). In the context of large-scale projects, addressing process conflict effectively is crucial to maintaining project flow and ensuring that projects meet their objectives within the planned timeframe and budget. Therefore, understanding and managing process conflict is integral to the successful delivery of construction projects.

Building Information Modelling (BIM)

Building Information Modelling (BIM) is a digital technology that creates a shared, comprehensive digital model of a construction project, integrating data from all stakeholders involved in the project. BIM has emerged as a powerful tool for improving project management in construction by offering real-time updates, enhanced collaboration, and improved decision-making. According to Bhonde et al. (2023), BIM plays a crucial role in reducing conflicts and

scope creep by providing a unified platform for all project stakeholders to work from a single source of truth, ensuring that changes are tracked and communicated effectively.

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Furthermore, Azhar (2020) suggests that BIM enhances the management of scope creep by enabling project teams to track changes in real time, ensuring that any scope changes are documented and approved before they are implemented. In this context, Wong et al. (2020) emphasize that BIM's real-time updates and visualizations enable better communication among stakeholders, reducing the risk of miscommunication that often leads to scope creep.

Project Success

The definition of project success has evolved over time. Initially, success was defined by the completion of a project within the scope, time, and budget constraints, also known as the "Iron Triangle" (Shenhar & Dvir, 2007). However, modern definitions now encompass broader criteria, including stakeholder satisfaction, quality, and sustainability (Turner & Zolin, 2012).

Shenhar and Dvir (2007) suggest that project success must be viewed from both a micro and macro perspective. On a micro level, success refers to meeting the immediate goals of the project, such as delivering the product on time, within budget, and to the desired quality. At a macro level, project success also involves achieving organizational and societal benefits, such as creating long-term value for the organization and community.

Pinto and Slevin (1988) argue that stakeholder satisfaction should be considered a crucial determinant of project success. Recent studies have extended the concept of success to include elements such as the sustainability of the project outcomes and the quality of collaboration among stakeholders (Aaltonen & Sivonen, 2009). Müller and Turner (2007) also emphasize that effective project governance and leadership are essential for project success, as they ensure that stakeholder needs are met and that conflicts, such as those related to scope creep and process conflict, are managed efficiently.

Theoretical Framework

The theoretical framework for this study is grounded in several key theories that explain the relationships between the variables of scope creep, process conflict, project success, and BIM. These theories provide a basis for understanding how BIM can moderate the effects of scope creep and process conflict on project success.

Unified Theory of Acceptance and Use of Technology (UTAUT) – The UTAUT theory, developed by Venkatesh et al. (2003), postulates that the adoption of new technology is influenced by factors such as perceived usefulness, ease of use, and social influence. In the context of BIM, the theory helps explain how the perceived benefits of BIM, such as improved communication and better decision-making, influence its adoption by construction professionals and its effectiveness in managing scope creep and process conflict.

Conflict Resolution Theory – This theory emphasizes the need for conflict resolution strategies in managing disputes among project stakeholders. According to Rahman et al. (2023), BIM can play a key role in conflict resolution by providing a collaborative platform for stakeholders to share information and resolve conflicts before they escalate. BIM enables better coordination and early detection of potential conflicts, which can mitigate the negative impacts on project success.

Theory of Project Success – The Theory of Project Success extends traditional project management models by incorporating broader success factors such as stakeholder satisfaction, sustainability, and long-term benefits (Turner & Zolin, 2012). In this study, the theory helps to conceptualize project success not only in terms of time, cost, and quality but also in terms of effective collaboration, risk management, and stakeholder engagement—all of which can be enhanced through the use of BIM.

Hypothesis Development

Process conflict refers to disagreements among stakeholders regarding the methods, procedures, or roles involved in a construction project. Studies by Rahman et al. (2023) and Li et al. (2021) suggest that process conflict leads to delays, miscommunication, and inefficiencies. Sacks et al. (2023) further argue that unresolved process conflicts can damage stakeholder relationships, hinder decision-making, and disrupt project workflows. These conflicts can ultimately undermine the success of a project by preventing timely completion and escalating costs. As Wang & Li (2022) show, process conflict is particularly detrimental when stakeholders, such as contractors and clients, have conflicting goals or unclear roles.

The literature supports the idea that resolving process conflict is essential for ensuring that construction projects meet their objectives. BIM plays a key role in mitigating process conflicts, as it enables real-time communication and improves collaboration among stakeholders. This is evident in Chong et al. (2022), who argue that BIM helps reduce misunderstandings by providing a shared platform for all parties involved in the project. Hence, following hypothesis is proposed

H1: Process conflict negatively impacts project success.

Scope creep is one of the most prevalent issues in construction project management. It occurs when the project's scope expands beyond the original plan, often without corresponding adjustments to resources, timelines, and budgets. According to Hughes et al. (2023) and Marzouk et al. (2021), scope creep results from inadequate planning, unclear project goals, and client-driven changes that are not properly documented or approved. Singh & Zayed (2023) argue that scope creep leads to budget overruns, delays, and often subpar quality, which ultimately compromises the success of a project.

Kerzner (2023) emphasizes that proper scope management is crucial for maintaining control over the project's timeline and cost. Shirazi et al. (2017) further suggest that lack of clear scope definition and failure to implement formal change control procedures contribute significantly to scope creep. Baig & Kureshi (2018) note that scope creep is especially common in large-scale infrastructure projects, where changes to the scope are frequent and difficult to manage.

H2: Scope creep negatively impacts project success.

The moderating role of BIM in managing process conflict and improving project success is widely acknowledged in the literature. BIM helps mitigate process conflicts by providing a centralized platform for collaboration, ensuring that all stakeholders have access to the same information and are aligned in their understanding of the project (Chong et al., 2022). Azhar (2020) and Abubakar et al. (2023) argue that BIM enhances communication, reduces misunderstandings, and facilitates early conflict resolution, thus preventing process conflicts from negatively affecting the project.

Sacks et al. (2023) further highlight that BIM provides real-time updates, which help stakeholders address any conflicts or disagreements early in the project. This ability to quickly identify and resolve conflicts is vital for maintaining the project's schedule and quality. Therefore, the literature supports Hypothesis 3, which suggests that BIM moderates the relationship between process conflict and project success, by improving communication, collaboration, and decision-making among stakeholders

H3: BIM moderates the relationship between process conflict and project success.

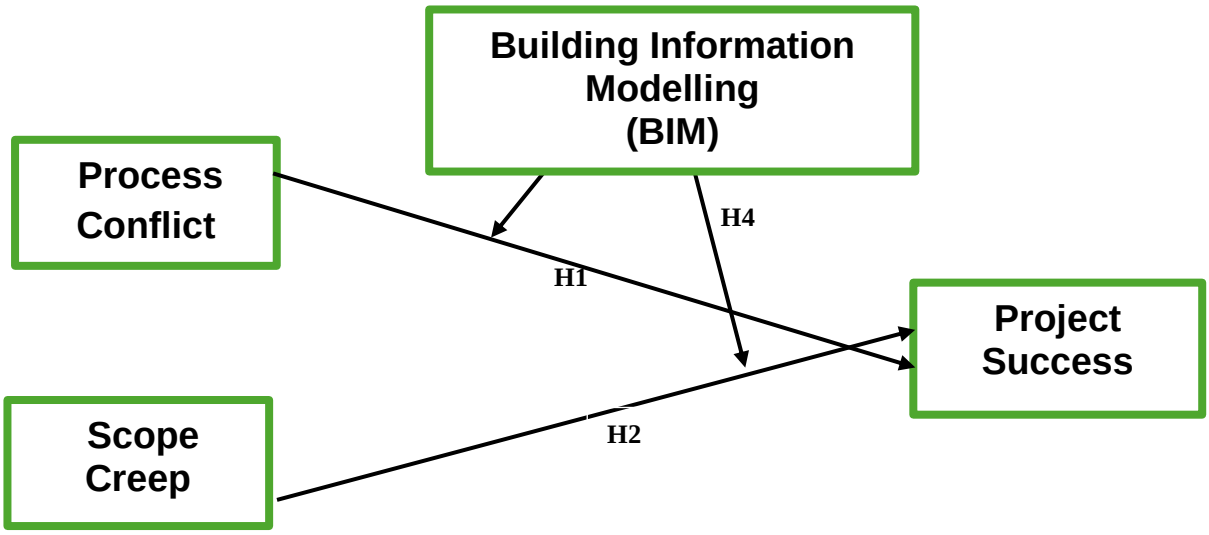
BIM's ability to manage and track project changes makes it an effective tool for mitigating scope creep. According to Abubakar et al. (2023) and Azhar (2020), BIM enables project teams to visualize the project scope in 3D, track changes in real time, and document modifications, which helps prevent unauthorized changes that contribute to scope creep. Wong et al. (2020) assert that BIM improves collaboration and communication among stakeholders, ensuring that any changes to the project are discussed and approved by all parties involved.

Singh and Zayed (2023) explain that BIM allows stakeholders to assess the impact of scope changes before they are implemented, providing an opportunity to manage potential risks and avoid budget overruns or delays. Kassem and Succar (2023) also emphasize that BIM's visualization and data management capabilities allow for better scope management, helping to keep the project on track and within its defined scope, budget, and timeline.

Thus, Hypothesis 4 suggests that BIM moderates the relationship between scope creep and project success by enabling more effective scope management and reducing the negative impacts of scope changes on project success.

H4: BIM moderates the relationship between scope creep and project success.

Figure 1: Proposed conceptual Model



Methodology

Population and Sample Size

The population for this research includes employees from the construction industry in Pakistan, specifically from government, private, and international construction companies in cities such as Islamabad, Rawalpindi, Lahore, Karachi, and Peshawar. This diverse selection is based on the convenience of the researcher, ensuring a varied sample of industry professionals from both the public and private sectors.

The study uses a sample size of 300 respondents, as calculated using the Krejcie and Morgan (1970) formula. This sample size is considered robust for ensuring that the findings can be generalized to the larger population of construction professionals across the selected cities. Data was collected using purposive sampling, ensuring that the respondents had the necessary qualifications and experience.

Data Collection and Measures

For data collection, structured questionnaires were employed as the primary method. These were distributed both physically and online via Google Forms to enhance response rates and

cover a wide range of construction professionals. The closed-type questionnaire contained fixed responses, with a 5-point Likert scale used to measure attitudes towards scope creep, process conflict, BIM, and project success. The questionnaires were administered to professionals like engineers, managers, and team leaders structs in the model were measured based on established scales from previous research. The scales include:

Table 1: Scales

Construct	Source of Scale	No. of items
Scope Creep	Moneke and Echeme 2016	13
Process Conflict	Wu G Liu 2017, C Zhao, 2017	6
Building Information Modelling (BIM)	Gyarteng, K. A. (2014)	12
Project Success	Aga and Valllejo (2016)	14
Total		45

Reliability and Validity

As a researcher, it is critical to establish the reliability and validity of the instruments and constructs used in a study to ensure the accuracy and consistency of the findings. In the present research, a quantitative approach was adopted, with questionnaires serving as the primary data collection tool. The reliability of the constructs was assessed using Cronbach's Alpha, a widely accepted measure of internal consistency. This step ensured that the survey items were consistently measuring the same concept, which is crucial for maintaining the integrity of the data. In addition to reliability, construct validity was examined to confirm that the constructs adequately represented the theoretical variables they were intended to measure. Composite reliability and Average Variance Extracted (AVE) were employed as measures of convergent validity, verifying that the constructs effectively captured the relevant data. These methods helped to substantiate the reliability of the findings, providing confidence that the moderating role of Building Information Modelling (BIM) in managing scope creep and process conflict within construction projects is both theoretically sound and empirically supported. By employing these rigorous testing procedures, this study contributes to the growing body of knowledge on the role of digital tools in improving project outcomes.

Common Method Bias

To minimize common method bias, the study employed screening questions to ensure that the selected participants had relevant knowledge and experience. Additionally, responses were obtained in a manner that ensured independence—participants provided their responses individually without being influenced by others. Statistical tests for multicollinearity (Variance Inflation Factor, VIF) were conducted to ensure that the relationships between the variables were not excessively correlated, which could distort the findings.

Findings

Demography

The demographic analysis of the study provides a detailed overview of the professional backgrounds and experience levels of the participants. The majority of the respondents were Civil & Structural Engineers, making up 38% of the sample, followed by Project Managers at 25.3% and Planning Engineers at 16.7%. These professionals represent the core of the construction project teams, with smaller proportions of Team Leaders (14%) and other roles (6%). This distribution of roles highlights the expertise and experience of individuals who are directly involved in the project management and technical aspects of construction.

In terms of professional experience, the sample included a broad range of expertise, with 26% of respondents having 2 years of experience, 21% having between 3 to 5 years, and 37% having 6 to 10 years of experience. A smaller group, 16%, had 11 to 20 years of experience in the construction industry, reflecting a mix of relatively new professionals and experienced veterans. This diverse range of experience levels allowed for a more comprehensive view of the issues faced in the industry, from both a novice and an experienced perspective.

The data on the participants' current roles showed that the majority were in Manager-level positions (42.7%), with Management Trainees (32%) also forming a significant portion. A smaller group, 19.3%, were in Senior Management roles, and 6% were in Top Management. This indicates that a significant portion of the respondents held decision-making roles in their respective organizations, providing valuable insights into higher-level management challenges and strategies.

Regarding the adoption of Building Information modelling (BIM), the majority of respondents, 87.7%, reported having experience with BIM, which suggests that BIM is becoming a standard tool in the construction industry. Among these, 47% used BIM occasionally, while 25% used it on a daily basis. This highlights the growing integration of BIM in the industry, particularly in larger-scale projects where real-time updates, coordination, and data management are crucial for project success.

Overall, the demographics reflect a sample of experienced professionals, most of whom are involved in management and decision-making within their organizations. The high level of BIM adoption also suggests that technology is becoming a key component in modern construction practices, which is crucial for understanding the role of BIM in mitigating challenges like process conflict and scope creep in the industry.

Correlation Analysis

The correlation analysis of the study revealed several significant relationships between the key variables, providing insights into how they are interconnected and their impact on project success.

Firstly, a moderate positive correlation of 0.542 was found between Scope Creep (SC) and Process Conflict (PC). This indicates that as scope creep increases, process conflict among project stakeholders also tends to rise. When the scope of a project expands without proper adjustments, it often leads to confusion, miscommunication, and disagreements among stakeholders, particularly regarding timelines, resources, and deliverables. These issues create an environment ripe for process conflicts.

Secondly, the analysis revealed a strong negative correlation of -0.693 between BIM and Scope Creep. This suggests that the more frequently BIM is used, the less likely scope creep is to occur. BIM’s ability to provide real-time project updates, detailed visualizations, and clear communication channels among stakeholders allows for better scope management. By providing a clear picture of the project’s status and making it easier to track changes, BIM helps reduce the chances of uncontrolled scope expansion, which often leads to scope creep.

Table 2: Correlation

Variables	1	2	3	4
Scope Creep (SC)	1			
Process Conflict (PC)	.542**	1		
Building Information Modelling (BIM)	-.693**	-.769**	1	
Project Success (PS)	-.782**	-.681**	.730**	1

Furthermore, BIM and Project Success (PS) showed a strong positive correlation of 0.730. This means that as BIM usage increases, project success also improves. The use of BIM significantly enhances project outcomes by improving communication, collaboration, and decision-making among stakeholders. It helps in tracking project progress, identifying potential issues early, and ensuring that the project remains on track in terms of cost, time, and quality.

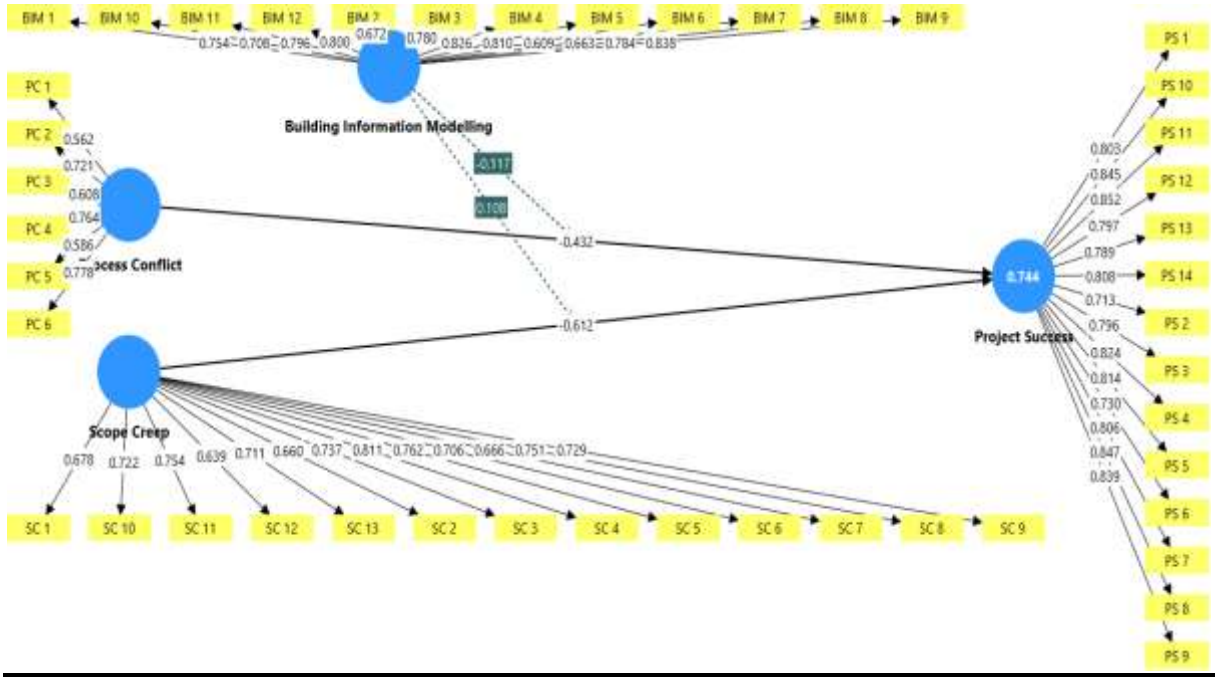
Finally, there was a strong negative correlation of -0.681 between Process Conflict (PC) and Project Success (PS). This indicates that as process conflict increases, the likelihood of achieving project success decreases. Disagreements and misalignments among stakeholders over project processes, tasks, and roles create inefficiencies, delays, and increased costs, all of which negatively affect project success.

Overall, the correlation analysis confirms that BIM plays a significant role in improving project outcomes by reducing both scope creep and process conflict, while contributing positively to project success. These findings underline the importance of adopting BIM in construction projects to ensure better coordination, control, and successful project delivery.

Hypothesis Results

The hypothesis results of this study provide valuable insights into the relationships between process conflict, scope creep, Building Information Modelling (BIM), and project success. Each hypothesis was tested rigorously, and the findings shed light on the significant impacts of process conflict and scope creep on construction projects, as well as the moderating role of BIM.

Figure 2: Structure Model



Starting with Hypothesis 1, which proposed that process conflict negatively impacts project success, the results confirmed this relationship with a path coefficient of -0.432 and a p-value of 0.000, which is statistically significant. This indicates a strong negative relationship between process conflict and project success. Essentially, the data suggest that as process conflict increases, the likelihood of project success decreases significantly. Process conflict arises when stakeholders—such as contractors, clients, and project teams—disagree on how to carry out

tasks or processes involved in the project. Such conflicts often lead to delays, miscommunications, and inefficiencies, all of which disrupt the smooth execution of the project. This finding aligns with previous studies, which argue that unresolved process conflicts create bottlenecks in decision-making and resource allocation, making it difficult for the project to meet its deadlines, budget, and quality standards.

For Hypothesis 2, which posited that scope creep negatively impacts project success, the hypothesis was also supported with a path coefficient of -0.612 and a p-value of 0.000, both of which are statistically significant. The strong negative relationship between scope creep and project success indicates that as scope creep increases, the chances of a project being successful diminish. Scope creep refers to the uncontrolled expansion of a project's scope without adequate adjustments in resources, time, and budget. This often happens when changes are made without proper approval or documentation, leading to budget overruns and extended timelines. The data from this study reinforces the understanding that scope creep is a significant risk to project success, as it undermines both the timeline and cost management, which are crucial for delivering a project on time and within the allocated budget. The findings suggest that managing scope changes through proper documentation and approval processes is essential to minimize their negative effects on project outcomes.

Moving to Hypothesis 3, which suggested that BIM moderates the relationship between process conflict and project success, the results provided strong support for this hypothesis. The path coefficient for this moderation effect was -0.117, with a p-value of 0.006, both of which were statistically significant. These results indicate that BIM does indeed play a moderating role in reducing the negative impact of process conflict on project success. BIM's ability to provide real-time updates, improve collaboration, and centralize information allows all stakeholders to access the same data and align their understanding of the project. This transparency and collaboration help resolve process conflicts before they escalate, ensuring smoother project execution. The moderating effect of BIM means that even if process conflicts arise, the presence of BIM helps mitigate their impact by enabling better communication and coordination, preventing delays, and improving decision-making. This finding is consistent with research that highlights BIM's role in enhancing coordination and conflict resolution through a shared digital platform.

Table 3: Reliability And Validity

Construct	Cronbach's Alpha	Composite Reliability (ρ_a)	AVE
Project Success	0.958	0.959	0.649
BIM	0.931	0.933	0.573
Scope Creep	0.922	0.926	0.517
Process Conflict	0.759	0.782	0.456

Finally, Hypothesis 4 proposed that BIM moderates the relationship between scope creep and project success, and the results confirmed this relationship as well. The path coefficient for this moderation was 0.108, with a p-value of 0.015, indicating that the effect is statistically significant. This result shows that BIM has a positive moderating effect, reducing the negative consequences of scope creep on project success. BIM helps manage scope changes by offering a clear and detailed visual representation of the project, allowing all stakeholders to see the impact of any changes in real time. This real-time tracking and documentation of scope changes ensure that any modifications are properly approved and accounted for, preventing uncontrolled scope creep from occurring. By enabling more effective scope management, BIM contributes to keeping the project within its defined budget, timeline, and scope, which

ultimately enhances project success. This finding underscores the importance of BIM in construction project management, particularly in reducing the risks associated with scope creep.

In conclusion, the results of the hypothesis testing strongly suggest that both process conflict and scope creep have a negative impact on project success, while BIM plays a crucial moderating role in reducing these negative impacts. The study provides compelling evidence that BIM not only enhances communication and coordination among project stakeholders but also helps manage changes to the project scope and resolve conflicts, ensuring that projects are more likely to be completed on time, within budget, and with the desired quality. These findings highlight the critical role that BIM can play in improving project outcomes, making it a valuable tool in modern construction project management.

Table 4: Bootstrapping Values

Path	β (O)	T-Value	P-Value	CI [2.5%, 97.5%]
Process Conflict → Project Success	-0.432	6.022	0.000	[-0.559, -0.276]
Scope Creep → Project Success	-0.612	13.817	0.000	[-0.692, -0.517]
BIM × Process Conflict → Project Success	-0.117	2.774	0.006	[-0.197, -0.028]
BIM × Scope Creep → Project Success	0.108	2.433	0.015	[0.012, 0.190]

Discussion

The findings of this study provide significant insights into the impact of scope creep, process conflict, and the moderating role of Building Information Modelling (BIM) on project success. The results confirm that scope creep negatively affects project success, as uncontrolled changes to the project scope led to delays, budget overruns, and compromised quality. The significant negative correlation between scope creep and project success (path coefficient of -0.612, p = 0.000) emphasizes the importance of managing scope changes effectively to ensure successful project outcomes. Similarly, process conflict, defined as disagreements among stakeholders regarding project processes, also had a detrimental effect on project success, with a path coefficient of -0.432 (p = 0.000). These finding highlights that when stakeholders are not aligned on processes, it disrupts project workflows and leads to inefficiencies, making it difficult for projects to meet their objectives.

A key contribution of this study is the exploration of BIM's role in mitigating the negative effects of both scope creep and process conflict. The results show that BIM plays a moderating role in the relationship between scope creep and project success, with a significant path coefficient of 0.108 (p = 0.015). This suggests that BIM, by offering real-time tracking, detailed project visualizations, and a centralized platform for communication, helps reduce the risks associated with scope changes, ensuring that projects stay within scope, budget, and timeline. Similarly, BIM was found to moderate the relationship between process conflict and project success with a path coefficient of -0.117 (p = 0.006). While the effect was moderate, it indicates that BIM can improve communication and coordination among stakeholders, helping to resolve conflicts before they escalate and thereby improving project outcomes.

These findings support the notion that BIM is a powerful tool for managing scope creep and process conflict, but they also highlight that BIM alone cannot address all project challenges. While BIM effectively handles technical and logistical issues, its impact on resolving interpersonal conflicts remains limited. This suggests that while BIM plays a crucial role in project success, it should be integrated with strong conflict resolution strategies and leadership practices to address both technical and behavioural challenges in construction projects. Furthermore, the study provides practical implications for project managers, advocating for the

integration of BIM into project management practices to enhance coordination, reduce scope creep, and manage process conflict effectively.

While this study offers valuable insights, it also has certain limitations. The research was conducted within the context of Pakistan's construction industry, and the findings may not be directly applicable to other regions or sectors. Future research could expand the scope of this study to other countries or project types to validate these findings in different contexts. Additionally, further studies could explore how BIM can be combined with other digital tools or technologies to enhance project performance. Moreover, future research could examine the integration of BIM with human-centered conflict resolution strategies to address the interpersonal aspects of process conflict, which were not fully resolved by BIM in this study. Overall, the study contributes to the body of knowledge on the role of BIM in modern construction project management and emphasizes the importance of adopting digital tools in conjunction with traditional project management practices to ensure project success.

This research ultimately shows that BIM, when used strategically, can play a pivotal role in improving project outcomes, mitigating risks associated with scope creep and process conflict, and contributing to the overall success of construction projects.

Theoretical Implications

The theoretical implications of this study contribute significantly to the understanding of project success, Building Information Modelling (BIM), scope creep, and process conflict in construction management. The study reinforces and extends existing theoretical frameworks, such as the Iron Triangle theory of project success, which traditionally focuses on time, cost, and quality. By demonstrating that scope creep and process conflict are key factors that hinder project success, this research emphasizes the need for project managers to address these challenges to achieve project goals. The findings suggest that BIM plays a crucial moderating role in managing these issues, thereby expanding the application of the Iron Triangle to include modern technological tools like BIM as vital components in enhancing project outcomes. Additionally, this study contributes to Conflict Resolution Theory by showing that BIM helps resolve process conflicts by improving communication, collaboration, and coordination among stakeholders. It highlights that BIM is not just a technical tool but also a facilitator of smoother project execution through conflict reduction, supporting previous studies that advocate for digital tools to complement traditional conflict resolution practices. Furthermore, the research aligns with Technology Acceptance Models (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) by demonstrating that BIM adoption positively influences project success through its perceived usefulness and ease of use. The study adds to the Project Success Theory by broadening the success dimensions beyond traditional constraints to include improved stakeholder satisfaction, reduced conflict, and enhanced collaboration, all of which are facilitated by BIM. This theoretical advancement suggests that project success should consider both technological and human factors in construction projects. Finally, the study also contributes to Innovation Diffusion Theory, as it shows that BIM adoption can help overcome resistance to change in construction practices and lead to more efficient project delivery. The findings underline the importance of integrating BIM with effective project management strategies and conflict resolution techniques to ensure comprehensive project success in modern construction.

Practical Implications

The practical implications of this study are highly relevant for construction managers, project teams, and industry stakeholders, especially in terms of improving project outcomes by addressing scope creep, process conflict, and enhancing project success through the use of Building Information Modelling (BIM).

Firstly, the study underscores the importance of clear scope definition and effective scope management to prevent scope creep. Construction managers and project teams should establish a well-defined project scope from the outset, ensuring that all stakeholders have a shared understanding of the project's objectives, deliverables, and timelines. Furthermore, implementing a formal change control process is crucial for managing scope changes. This includes ensuring that all proposed changes are thoroughly evaluated, documented, and approved before being incorporated into the project. By doing so, construction projects can avoid the negative consequences of scope creep, such as cost overruns and delays, thereby improving the likelihood of project success.

Secondly, the study highlights the need for conflict management strategies to address process conflict in construction projects. Project managers should foster a collaborative and transparent project environment where stakeholders are encouraged to communicate openly about issues that arise. The use of BIM plays a key role in this, as it provides a centralized platform that facilitates real-time updates, enabling all stakeholders to access the same information. By using BIM, project teams can address process conflicts early, preventing them from escalating into major issues that disrupt project progress. Additionally, project managers should integrate conflict resolution practices alongside BIM, ensuring that interpersonal or organizational conflicts are effectively resolved to maintain a harmonious working environment.

The study also emphasizes the practical utility of BIM as a tool for project success. Construction managers should actively adopt and integrate BIM into their project management processes. BIM enables better coordination, communication, and decision-making, which are essential for the successful completion of complex projects. The findings suggest that BIM helps reduce both scope creep and process conflict, thus improving the overall project outcome. For organizations that are still hesitant about adopting BIM, this study provides compelling evidence of its value, showing that BIM not only streamlines workflows but also ensures that projects stay on track, within budget, and on time.

In addition, this study suggests that BIM should be combined with human-centered conflict resolution strategies. While BIM addresses the technical aspects of project management, it is equally important to consider the human factors—such as stakeholder alignment, effective leadership, and team collaboration—that influence project success. Therefore, construction managers should focus on developing both technical competencies in BIM and interpersonal skills in conflict resolution to create a well-rounded approach to managing construction projects.

Finally, the findings offer insights into how technology adoption can positively influence project outcomes. Construction companies should prioritize BIM training for their teams and stakeholders to enhance the benefits of this tool. Given that BIM adoption leads to better communication and more efficient project management, companies that incorporate BIM into their practices will likely see improvements in project performance, client satisfaction, and overall profitability.

In conclusion, the practical implications of this study emphasize that construction projects can be managed more effectively by integrating BIM with sound project management practices, such as scope management, conflict resolution, and clear communication. By addressing scope creep and process conflict through the strategic use of BIM, construction managers can significantly enhance project success and deliver projects on time, within budget, and to the desired quality standards.

Conclusion

In conclusion, this research highlights the significant impact of scope creep and process conflict on the success of construction projects and underscores the critical role of Building Information Modelling (BIM) in mitigating these challenges. The findings provide strong empirical

evidence that both scope creep and process conflict have a detrimental effect on project success, as they lead to delays, cost overruns, and a decline in quality. These results affirm the importance of effectively managing project scope and resolving conflicts among stakeholders to ensure that projects are completed on time, within budget, and to the required quality standards.

Furthermore, the study demonstrates that BIM acts as an effective moderating tool in managing scope creep and process conflict. BIM facilitates enhanced communication, coordination, and collaboration among all project stakeholders, which in turn helps reduce misunderstandings and aligns project objectives. The ability of BIM to provide real-time updates and track project changes enables better management of scope modifications, preventing unauthorized scope increases that lead to scope creep. Additionally, BIM's role in promoting transparency and accessibility of information plays a crucial part in resolving process conflicts by ensuring that all stakeholders are working from the same set of data.

The theoretical implications of this research extend existing project management frameworks, such as the Iron Triangle, Conflict Resolution Theory, and Technology Acceptance Models. By integrating BIM into these frameworks, the study provides a more comprehensive understanding of how digital tools can complement traditional project management strategies. The study also suggests that, while BIM addresses technical aspects of project management, its effectiveness in resolving interpersonal conflicts is somewhat limited. Therefore, project managers should integrate BIM with human-centered conflict resolution strategies to address the interpersonal and organizational challenges that often arise in construction projects.

From a practical perspective, this research offers actionable insights for construction industry professionals. It emphasizes the need for robust scope management practices, effective conflict management techniques, and the adoption of BIM to improve project success. Construction companies should prioritize BIM adoption and ensure that project teams are adequately trained in its use, as it can significantly enhance project coordination and reduce the risks associated with scope creep and process conflict. By leveraging BIM, project managers can streamline communication and collaboration, ultimately leading to more successful and efficient project outcomes.

In conclusion, the findings of this study make a substantial contribution to the literature on project success in construction and the role of BIM in overcoming traditional project management challenges. The research confirms that BIM is a valuable tool in modern construction projects, offering a means to improve efficiency, reduce risks, and enhance overall project performance. Future research could explore further integration of BIM with other emerging technologies, such as Artificial Intelligence and Machine Learning, to further improve project management practices and outcomes. Additionally, further studies could examine the role of BIM in resolving interpersonal conflicts and its broader implications for global construction practices.

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