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Contractual and Relational Governance to Improve HVAC Sustainability: Mediating Effects of Managerial Innovation and Stakeholder Involvement

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HVAC Industry, Managerial Innovation, Open Communication, Pakistan, Punjab, Quality Project Execution

ABSTRACT

The qualitative research investigates the factors that affect the success and sustainability of HVAC organizations in Punjab, Pakistan. The study responds to the question of the sustainability of the HVAC company in the emerging market of Punjab through its focus on governance strategies (contractual and relational), managerial innovation, and stakeholder engagement. The data was obtained by carrying out interviews with 16 representatives of the successful HVAC companies and processed with the assistance of a six-step theme framework presented by Braun and Clarke. Findings showed that precise contracts improve efficiency, lower risks, and provide legal protection. Relational governance enhances cooperation, open communication and trust, which contributes to successful project delivery and long-term business relationships. Managerial innovation turned out to be one of the most important enablers, helping firms to overcome resource constraints and market uncertainties. Moreover, the stakeholders should be involved early because good communication and setting expectations helps in the success of business. Energy efficient technologies, regulatory compliance and client retention strategy were strongly linked with sustainability. Companies that emphasize quality project execution and services are more likely to be able to grow and stay competitive. Well-established operational procedures, such as workforce development, resource allocation, and strategic planning also contribute to project delivery in due time without much cost. It can also be helpful in addressing typical obstacles, such as scope creep and supply chain inefficiencies. This research study adds to the theoretical knowledge of governance, innovation, and sustainability in the context of HVAC industry of Punjab, Pakistan. It also provides practical information to businesses, policymakers, and industry stakeholders, who want to enhance their performance in operational processes and guarantee business sustainability in the long run.

INTRODUCTION

There are many studies conducted on business sustainability in different industries (construction, public projects, and so forth). In Pakistan, regarding HVAC companies, although many companies are doing business in this industry, many fails because of the business's sustainability (Iqbal *et al.*, 2021). To accomplish sustainability as long-term success of business, the impact of various factors that have an effect, either positively or negatively, on the sustainability of the business (Mardjuni *et al.*, 2022). SMEs use project and business management to put these improvements into practice (Tian *et al.*, 2023). Although this topic is covered in some areas, there is a gap in addressing contractual and relational governance impact on HVAC business sustainability in Punjab, Pakistan. There is an observed lack of focus on business stability within HVAC organizations before project initiation in Punjab Pakistan (Khalid *et al.*, 2023). The use of energy efficient technology is not widespread because most HVAC systems are outdated and consumes energy, increasing both the cost of operation and environmental impact (Zhang *et al.*, 2017). Lack of control and supervision in regard to installations and maintenance of HVAC leads to poor practices and unreliable systems (Sanchez-Triana *et al.*, 2014). This research study will focus on exploring the sustainability of companies operating in the HVAC sector in Pakistan. Through the perspectives of relational governance, managerial innovation, and contractual governance on company sustainability, this research study seeks to investigate how HVAC businesses address profitability. The HVAC business is rapidly expanding in Punjab, Pakistan, the sustainability in the long term is one of the primary concerns. To address this gap, the current study analyzes how both contractual and relational forms of governance influence the sustainability of HVAC companies. To accomplish this, the central research question that will guide the study will be: In what ways can managerial innovation improve the enforcement of contractual governance practices within Pakistani HVAC business? How stakeholders are crucial for ensuring effective contractual governance within the HVAC industry in Pakistan? How does relational governance effectively affect the managerial innovation in the HVAC business of Pakistan? How does relational governance effectively effect the stakeholder's involvement in HVAC business of Pakistan? This research could benefit the building, engineering, and infrastructure development industries by determining which factors influence the sustainability of HVAC businesses. Also, time limitations can limit the quantity of interviews and case studies that

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could be incorporated within the research, and this could further limit the thoroughness of the analysis. Relational and contractual governance mechanisms affect HVAC technology adoption, while stakeholder involvement spreads innovation as customer awareness and regulatory incentives encourage sustainable solutions. The partner connections are also explained in Figure 1. It also highlights the importance of partners in ensuring long-term business success.

Trust, contracts, and conventions increase satisfaction and reduce opportunism. Relational governance and contractual governance act as inputs that influence

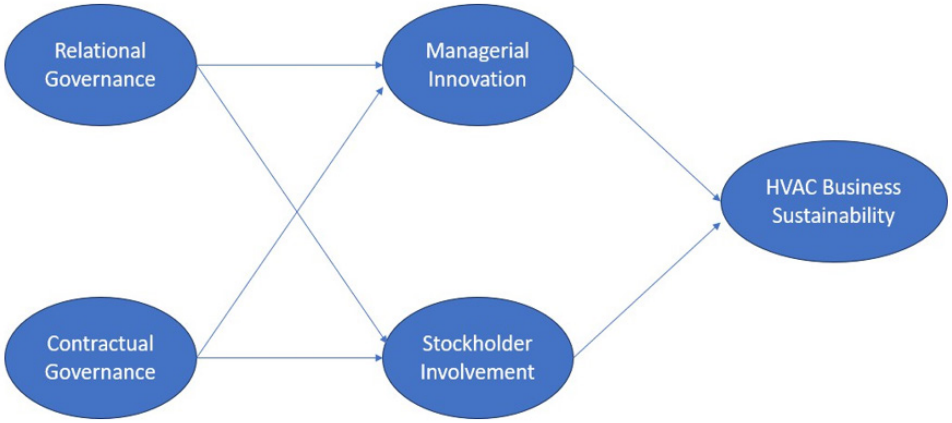


Figure 1: Visual representation of conceptual model

managerial innovation and stockholder involvement, those directly contributing to business sustainability. It shows that governance and stakeholder engagement are the two critical factors in the sustainability of the HVAC business.

LITERATURE REVIEW

HVAC Business and Sustainability

HVAC refers to the system that controls and flows the heated and cooled air in residential and commercial buildings, including houses, workplaces, and indoor stadiums. Mignon and Bankel (2023) state that sustainable development seeks to address people's immediate needs, while also safeguarding their capacity to independently resolve future challenges about environmental changes. Sustainability is affected by three types of factors including ecological, social, and economical factors (Xiong & Mok, 2020). Hueskes *et al.* (2017) explored that sustainability issues are minimized, and social sustainability is ignored. Xiong and Mok (2020) analyzed the effects of HKSCC in fostering sustainability among higher education institutions in Hong Kong. Mody *et al.* (2021) concluded that projects should generate more and better work at a reduced cost to achieve economic sustainability. Orji *et al.* (2020) found that the major factors were customer satisfaction, sufficient security and privacy, affordability, and competitive pressure that affect the supply chain sustainability. Elsaid *et al.* (2021) emphasized the improvements in HVAC system efficiency resulting from the improved environment, reduced nitrogen and carbon emissions, and increased ozone levels. Huo (2021) suggested that the necessity to reduce the consumption of resources and integrate environmentally friendly technologies into the HVAC systems to enhance the environment. Adaga *et al.* (2024) showed that business analytics maximizes outcomes and is in line with societal ideals and environmental responsibility.

Contractual Governance and HVAC Business

Roehrich and Lewis (2010) found that Contractual governance is the method of governance that relies on principal-agency relations and regulations that are concluded as the result of a contractual agreement. Tian *et al.* (2023), contractual governance refers to a type of governance that relies on the establishment of laws and relationships via contractual processing. She and Tang (2022) stated that contract governance prioritizes equity, collaboration, cooperation, and mutual benefit for HVAC business long-term viability. Reuer and Ariño (2007) reveal the contractual agreements might incorporate arrangements for featuring commitments, observing, and disciplines for air conditioning businesses. Jaafari's (2001) research, as per exchange cost financial matters, HVAC firms take a risk by either making agreements in an upward direction or coordinating, while implementing contracts, which turns out to be prohibitively expensive. Cheng *et al.* (2000), contractual governance allows general workers for hire to establish strong helpful organizations with subcontractors, providers, and other agreeable actions to overcome one-time and temporary project difficulties and establish a more stable store network. Li and Van Rooij (2021) found that Contractual governance involves ties of commitment between the public authority and society, as well as the movement of power and assets to lower levels of foundations that are necessary for the public area. Wong (2004), contractual governance reduces the lack of corporate administration among both parties and the poor performance of endeavors around the world. Awan *et al.* (2018) stressed the relevance of relational governance and cultural intelligence in improving social sustainability in workplace partnerships.

Relational Governance and HVAC Business

Cannon (1999), revealed that buyer-seller knowledge can be useful in B2B marketing and procurement. The relationships between suppliers and consumers vary in terms of supplier performance and consumer satisfaction. Studies by Cao and Lumineau (2016) indicated that the agreement or collection of agreed rules between two parties, formal or informal ones, can be regarded as inter-organizational mechanisms of governance. Colicchia *et al.* (2013), one of the ways sustainability can be measured in terms of relational governance is to analyze the complexity of the HVAC systems and the necessity of standard environmental measures. Law and Breznik (2018) compared the airline mission statements, values, and strategy. Innovation is significant between relational governance and business, which is frequently emphasized in the vision, mission, and goal statements of organizations. Zhou *et al.* (2010) indicated that the heat source temperature disparity affects SA-MSHP heating performance. Li *et al.* (2021) was accomplished by relying on the informal structure and self-implementation of accomplices to reduce the risks and opportunities associated with authoritative commitments. Li *et al.* (2022) findings indicated that asymmetric dependence, read trust, and process issues, such as communication and coordination have significant influence on the effectiveness of the project.

Managerial Innovations and HVAC Business

Daidj (2014) has predicted that the sharing of information between businesses might have a great impact on the level of customer satisfaction. Favoreu and Carassus (2022), management innovation refers to the implementation of relational governance, managerial, and operational strategies within a business to improve overall organizational performance. Secundo *et al.* (2021) argued that project management skills are necessary in the effective implementation of processes and the provision of resources needed to realize the project intentions. Hussain *et al.* (2022) discovered that HR management, activity planning, timeline management, and task management are key to success. Elgarhy and Abou-Shouk (2022) findings are that SCA is a partial mediator between SCA antecedents and MP. Naadoo and Gasparatos (2018) emphasized that the impact of retailers on the internal and external environment should be minimized.

Stakeholder Involvement and HVAC Business

Bazimya (2023), found that including stakeholders in project planning reduces conflicts and improves feasibility. Blind and Heß (2023) and Ouma and Kiarie (2017), a successful project must be timely, cost-effective, meet the original project deliverables, and be accepted and used by the clients who commissioned the project. Juffle *et al.* (2024) findings displayed mixed perceptions among the respondents in the categories according to affiliation and job. Nissanka *et al.* (2024) suggested that climate response strategies for construction sites must be holistic and multi-stakeholder because processes and systems are interconnected. Mashwama *et al.* (2019) found that sustainable construction practices in South Africa benefit the government, environment, and occupants and secure the earth for future generations. Primožič and Kutnar (2024) highlighted that stakeholders including architects, engineers, and builders advise consumers and decide on construction, and knowing their decision considerations were vital for sustainable construction. Oyewole *et al.* (2021), have found that stakeholders in developed and emerging economies are prepared to invest in sustainable structures. Kongela (2023) stated that global attention on sustainability in the construction sector is growing, however, many underdeveloped countries have not made much progress because of untreated sustainability issues.

Technology Innovations and HVAC Business

Rupp and Ghisi (2014) found that natural ventilation is an innovative HVAC energy efficiency method. A crucial consideration in the design of HVAC systems in older and well-established districts is the protective effect. Grand View Research (2021), the global market for heating, ventilation, and air conditioning systems is expected to reach $241.8 billion by 2025. Troch *et al.* (2016) indicated that HVAC systems produce a lot of CO2 during their lifetime, mostly from electrical energy usage. Savitha *et al.* (2021) on refrigerant's environmental impacts, the need for reduction of global warming and ozone depletion was stressed, while retaining energy efficiency. Fabrizio *et al.* (2014), the provided technology innovation for energy generation, ventilation, space heating, cooling, and domestic hot water is extremely beneficial to the development of the HVAC business. Gibbons and Javed (2022) found that high-efficiency heat recovery and balanced ventilation were the most popular ventilation systems. Suyambazhahan *et al.* (2021) stated that the advancement of technology has made it possible to create more energy efficient HVAC systems, resulting in the availability of reasonable solutions for different projects. Hoang and Nguyen (2021) analyzed the features, practicality, and challenges of smart renewable energy and integrated energy systems in smart cities. Hauashdh *et al.* (2024) discovered that the HVAC project technology has the potential to enhance construction project flexibility, tenant happiness, and efficiency.

Climate Management and HVAC Business

Ebirim *et al.* (2024) defined HVAC climate management as the techniques and technology of controlling inner climate and also controlling the HVAC systems. Asim *et al.* (2016) examined whether a solar cooling system would be able to support room temperatures in the warm climate of Pakistan. Balogun *et al.* (2024) provided that the simulating various scenarios, architects could improve the effectiveness of the HVAC system design to meet the requirements of future temperature level, rain, and severe weather conditions. Aldunce *et al.* (2021) studied that Cooperation between partners is essential in

installation of air conditioning systems and in dealing with environmental problems. Ran *et al.* (2024) recommend that concluded that roof insulation significantly lowered the heating needs and energy consumption. Liu *et al.* (2020) recommended that building design should consider efficient filtration, ventilation, and humidity control to enhance indoor air quality and guarantee the health of building occupants. Li *et al.* (2022) examines that HVAC systems have a high energy consumption rate, which results in the depletion of non-renewable energy resources, primarily fossil fuels, used for generating electricity or thermal energy.

Green Building Technologies and Sustainable HVAC Systems

The literature review highlighted that conventional HVAC systems consume excessive energy and use refrigerants that contribute to global warming, making them inconsistent with green building sustainability goals (Ali and Akkas, 2024). Researchers emphasized that HVAC systems account for nearly 30–50% of building energy consumption and can significantly impact environmental sustainability (Satrio *et al.*, 2019), while energy-efficient systems may reduce energy use by up to 40% (Hang and Kim, 2018). Jouhara and Yang (2018) defined energy efficiency as reducing energy waste while maintaining the same outcomes, whereas Komorowska and Surma (2024) discussed how regulations, fuel prices, and carbon policies affect district heating systems. Wade *et al.* (2016) highlighted the importance of installers' professional expertise and community learning in influencing domestic heating decisions. Santamouris (2016) predicted that global cooling demand would continue increasing because of economic growth, urbanization, and climate change, while Ilojianya *et al.* (2024) stressed the importance of digital technologies, smart grids, renewable energy integration, and partnerships between governments and businesses. Jabbour *et al.* (2019) explored renewable HVAC technologies such as geothermal systems, biomass boilers, evaporative cooling, polymer heat exchangers, and desiccant dehumidification systems.

Sustainable Development and Management in HVAC Business

Asim *et al.* (2022) defined sustainable HVAC development as the design, implementation, and maintenance of systems that minimize environmental impact, improve energy sustainability, and create healthy indoor environments. Lazzarin (2020) evaluated solar-assisted heat pumps and concluded that combining solar energy with heat pump technologies can significantly reduce fossil fuel use, while Ma *et al.* (2019) found that most solar-powered net-zero-energy homes rely on heat pumps for both heating and cooling. In the Pakistani context, Iqbal *et al.* (2020) emphasized that project leadership and sustainability practices positively influence project success in economic, social, and environmental dimensions. Gerasymenko *et al.* (2014) noted that HVAC organizational performance and financial efficiency remain under-researched despite their importance. Zhan *et al.* (2020) highlighted that customer service, service awards, and service-oriented business models improve customer loyalty and financial performance. Almeida *et al.* (2022) proposed value-based management frameworks for infrastructure-intensive businesses, while Oe and Yamaoka (2023) identified leadership, organizational culture, lean management, personnel capability, and technology as major factors influencing HVAC business success. Overall, these studies concluded that sustainable HVAC development depends on effective leadership, strategic management, innovation, customer-centered services, and efficient use of renewable energy technologies.

MATERIALS AND METHODS

Research Philosophy and Approach

The study was used to examine how contractual and relational governance affect HVAC sustainability in Punjab, Pakistan. The interpretivist paradigm was relevant since the study sought to comprehend HVAC managers, engineers, sales professionals, and project staff's views, experiences, and practical realities. Qualitative inquiry was best for the research aims since governance practices, stakeholder connections, management innovation, and sustainability are socially formed by organizational interactions and experiences. The study used semi-structured interviews for qualitative research. The researcher gained deep and thorough insights about HVAC company governance, stakeholder involvement, innovation management, trust-building mechanisms, and sustainability-related decision-making using a qualitative method.

Research Design

This study employed exploratory qualitative research. Limited research exists on how contractual and relational governance improve sustainability in Punjab, Pakistan's HVAC sector, hence the exploratory approach seemed suitable. Governance, management innovation, stakeholder participation, crisis adaption, and relationship-based business practices in HVAC were examined. HVAC enterprises in Punjab, Pakistan, were studied. Punjab, one of Pakistan's major industrial and commercial provinces, was chosen because HVAC businesses are rapidly expanding due to urbanization, infrastructure development, commercial projects, and climate change and population growth-related cooling demands.

Population and Sampling

Directors, project managers, engineers, quality control, sales managers, after-sales support, and technical staff from HVAC firms were the target market. These HVAC industry experts were chosen for their expertise of governance frameworks, stakeholder management, project implementation, sustainability, and technology innovation. Participants with extensive HVAC operations

and governance expertise were selected using purposive sampling. Purposive sampling allowed the researcher to choose information-rich individuals with relevant and useful study ideas. We questioned 15 Punjab HVAC company employees from various divisions. Directors, assistant sales managers, project managers, service managers, engineers, and technicians attended. The multiplicity of participation gave the researcher varied insights on HVAC company governance and sustainability.

Data Collection Method

We acquired primary data through semi-structured interviews. Semi-structured interviews were chosen because they allow for participant exploration while preserving consistency. Literature study and research goals informed an interview guide. Contractual governance, relational governance, managerial innovation, stakeholder participation, sustainability practices, technology progress, crisis management, communication systems, and organizational performance were discussed in the interview. Interviews were performed face-to-face or online based on participant availability and convenience. Each interview lasted 40–60 minutes. Each participant gave consent before being interviewed and recorded. The study's goal, confidentiality, and voluntariness were explained to participants. To promote clarity and communication, participants preferred English and Urdu for the interviews. To acquire correct data, audio and written notes were employed. Transcribing the interviews verbatim allowed for comprehensive analysis.

Data Analysis Technique

The study analyzed qualitative data thematically. Thematic analysis was used to identify, organize, and understand qualitative data patterns and themes. The researcher used Braun and Clarke's six-step thematic analysis process: data familiarization, initial coding, topic creation, review, definition, and report writing. The interview transcripts were thoroughly examined numerous times to familiarize with the data. Open coding was used to find important phrases, concepts, and patterns about governance, sustainability, innovation, trust, stakeholder involvement, and crisis adaption. Themes and categories were then created using similar scripts. Contractual governance, relational governance, managerial innovation, stakeholder involvement, trust-building practices, technology-driven innovation, crisis adaptation, collaborative communication, and relationship-based performance emerged from the analysis. To further comprehend participant experiences, sub-themes were identified beneath each primary subject. NVivo helped code, categorize, and organize qualitative data thematically. Qualitative analysis software increased data management, coding consistency, and result interpretation.

Validity and Reliability

The study used many qualitative validity and reliability measures to achieve credibility and rigor. Prolonged interaction with participants, extensive interview discussions, and member understanding during interviews ensured credibility. Various HVAC departments and managers provided insights for triangulation. Detailed audits of interview, code, theme development, and analytical conclusions increased reliability. Minimizing researcher bias and evaluating participant replies assured confirmability. Detailed details of the research environment, participant characteristics, and organizational settings let future researchers assess applicability in comparable circumstances. The study followed ethical research practices. Participants were informed of the research goals before participating. All subjects gave informed consent before interviews. The research was voluntary, and participants might leave at any time without penalty.

RESULTS AND DISCUSSION

Thematically presenting the results helps achieve the study aims. Short descriptions of each theme, sub-themes, and code are included. Privacy is maintained by using pseudonyms for participants. Themes-related NVivo outputs include coding summaries, word frequency charts, and matrix query tables. These images show how the findings were made. The table below lists six themes, 17 sub-themes, and 61 codes from the thematic analysis. Three Punjab-based HVAC businesses participated in this study. Table 1 represents the lists of participants' pseudonyms, firms, titles, and years of expertise.

Table 1: List of Participants

Sr. No.	Pseudonym	Company	Title	Experience in Years
1	Ahsan	AJRD	Head of Operations and Business Development	Over 30
2	Bilal	AJRD	Director	Over 20
3	Chaudhry	MIA Corporation	Manager Commercial	30
4	Danish	MIA Corporation	Operations and Sales Manager	15
5	Ehsan	MIA Corporation	Project Manager	15
6	Faizan	MIA Corporation	Manager Technical Services	35
7	Ghani	DWP Technologies	Quality & Commissioning Manager (MEP)	6
8	Hamza	DWP Technologies	Deputy Manager Project Central - MEP	18

9	Imran	DWP Technologies	Sales and services manager	6
10	Junaid	DWP Technologies	Assistant Service Manager	15
11	Kashif	DWP Technologies	Assistant Project Manager	5
12	Latif	DWP Technologies	Assistant Manager Sales. MEP Division	8
13	Moaz	DWP Technologies	Assistant Project Manager	5
14	Noman	DWP Technologies	Assistant Project Manager	6
15	Osama	DWP Technologies	Head of After Sales Services	12
16	Parvez	DWP Technologies	Project Manager	15

The thematic analysis resulted in six key themes, which are presented in the NVivo hierarchy chart, Figure 2. The relative size of each segment represents the proportion of coded references that are related to that theme. "Contractual Governance" and "Stakeholder Involvement" became the most prominent themes and together account for a large amount of the coded data. These themes entail the significance of governance framework and involvement of stakeholders. "Relational Governance" and "Technological Innovation" have intermediate proportions indicating a strong but secondary focus of relational governance mechanisms and technology-driven changes.

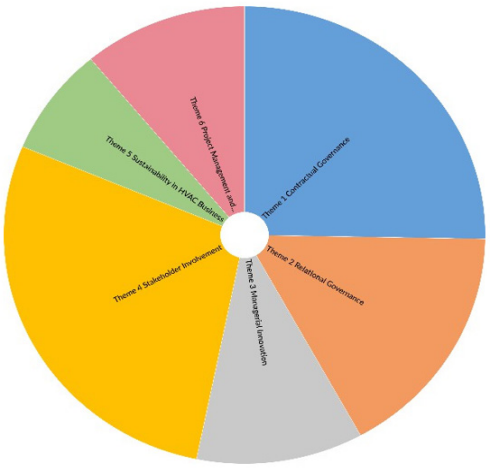


Figure 2: Hierarchy Chart for the comparative contribution of each theme

In contrast, "Sustainability in HVAC Practices" and "Project-based barriers" as themes were smaller parts of the dataset, indicating that even though participants recognized sustainability and project-specific challenges, they were not as prominent in their stories, and they attempted to concentrate on bringing about sustainability by enforcing governance mechanisms and stakeholder collaboration.

The participants of this research study have significant diversity in professional experience with less than 5 years to over 20 years of experience as indicated in Figure 3. The greatest contributions in terms of coded references came from the participants with more than two decades of experience. Mid-career professionals (6-15 years) offered a variety of input, both shared and unique experiences. Participants with 1-5 years of experience contributed less coded references, which may reflect less responsibilities and/or experience.

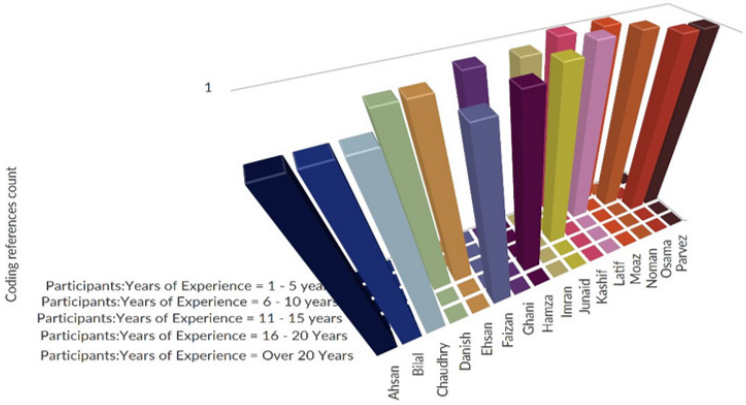


Figure 3: Participants and their respective years of experience

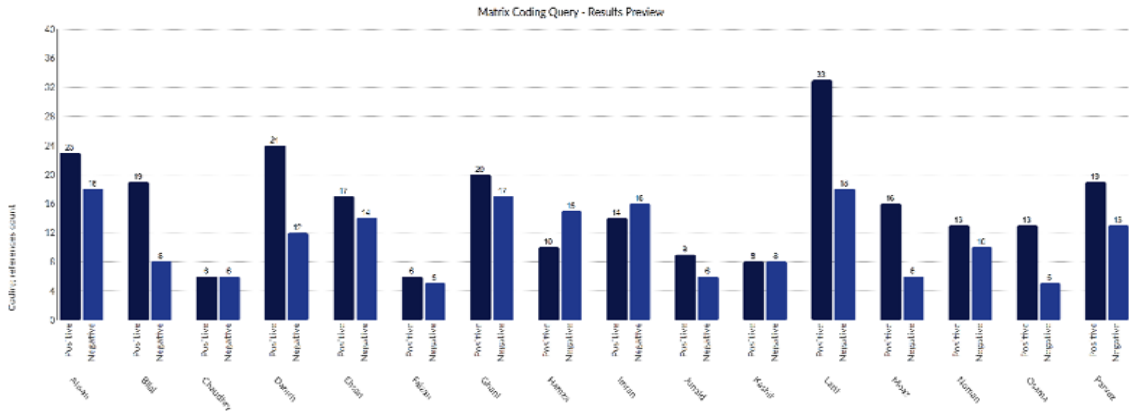


Figure 4: Overall Participant's Sentiment Analysis

Sentiment coding analysis showed that responses of participants were distributed quite evenly. Figure 4 illustrates that most of their narratives had both positive and negative sentiments. This indicates that respondents were neither explicitly positive nor negative. Importantly, Latif's contributions were found to be overwhelmingly positive and, thus, he was more optimistic. The sentiments were fairly evenly distributed among Bilal, Danish, and Faizan. Whereas Ghani was slightly biased towards negativity, the dataset as a whole did not exhibit any directional bias indicating the complexity of the topic being studied. Figure 5 illustrates A thematic analysis of sentiment showed that most themes had been equally divided between positive and negative references among the participants. The notable exception to this was that theme 2 resulted in a significantly higher percentage of positive sentiment (86 references) than negative sentiment (21 references).

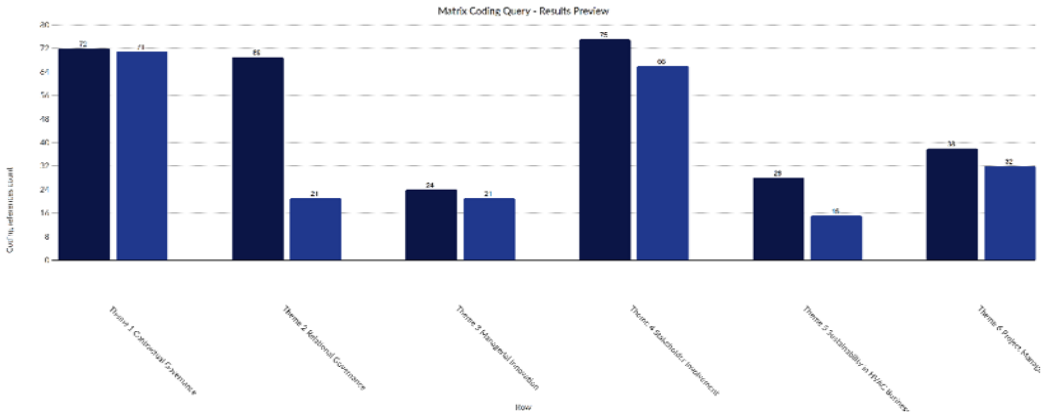


Figure 5: Participant's Sentiment by Theme

It suggests strong support for relational governance mechanisms among the stakeholders. Themes like contractual governance and technological innovation showed a near-even split of opinions between good and bad. Stakeholder involvement received the most coded references of any single topic with a slight positive bias in recognition of the collaborative practices and awareness of the difficulties involved. Sustainability-related issues

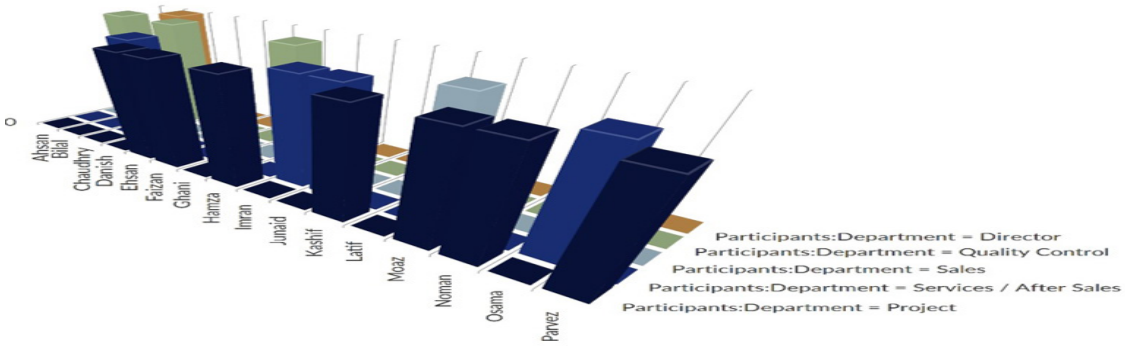


Figure 6: Participant's Department Representation

and project-specific barriers had slightly more positive references than negative ones.

The pool of participants includes individuals from various professional departments as illustrated in Figure 6, representing both technical and managerial perspectives. Almost half of the respondents (7/16) belonged to the project department and services/after sales department had 4 respondents. Quality control has three participants and sales have one participant only.

One of the respondents worked as a director of the company and provided some insights on the strategic level. Such diversity within departments implied that thematic analysis could be enriched. It involved views of individuals who were directly involved in the project implementation, delivery of services, quality monitoring and strategic decision making.

Theme 1: Contractual Governance

Overall, it appears that contractual governance was a significant contributor to the efficient functioning of the HVAC project delivery, as well as to the long-term sustainability of the business. The participants emphasized the need to acquire well-organized contracts, industry-specific operations and risk management via contract. The findings indicated that operational effectiveness and stakeholder trust directly relies on business outcomes like clarity, trust, openness, fairness, and enforceability in the contracts.

All responded to contractual governance but with varying degrees of emphasis, as shown in Figure 7. Ahsan and Hamza made the biggest contributions. There was an extended conversation over contractual requirements and

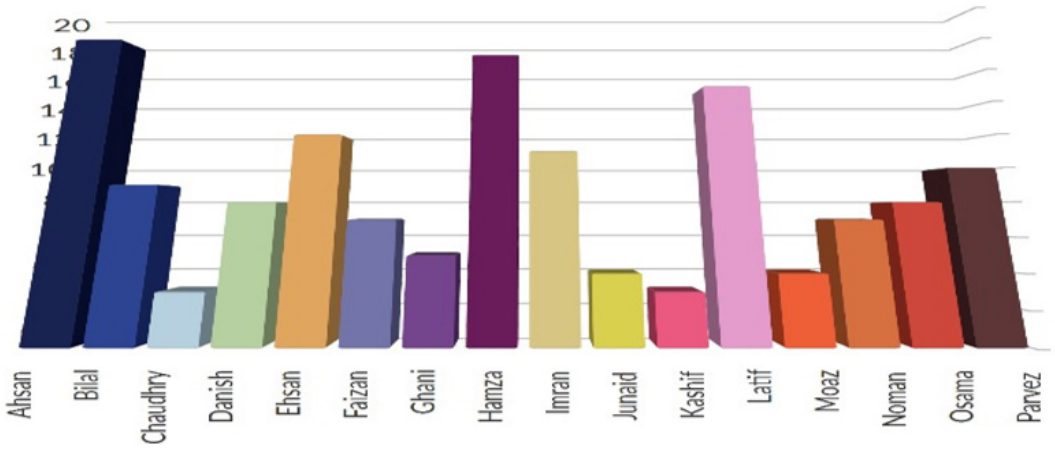


Figure 7: Theme 1: Contractual Governance and Participants

compliance matters. Kashif, Ehsan and Imran engaged deeply with the theme of contractual governance providing both the examples of completing and going projects. Other respondents, such as Chaudhry, Junaid, Latif and Moaz provided few references. They discussed the concept of contract governance within the wider framework of project management or stakeholder management. The broad range of contributions shows that the significance of contractual governance differs among individuals.

The affiliation of contractual governance by department is shown in figure 8. It was discovered that the majority of coded references belong to the project department. This is a sign of how contractual attention is crucial to project planning, execution and delivery. Service/after sales participants also made significant contributions,

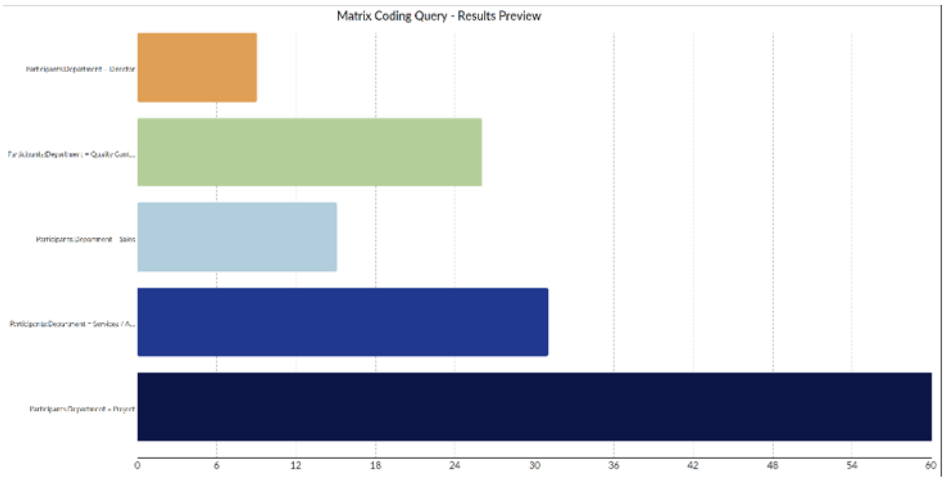


Figure 8: Theme 1: Contractual Governance by Department

highlighting the relevance of contractual provisions in the post-project service delivery and relations management. The quality control personnel linked contractual governance to standards compliance and sales contributions to pre-contract negotiation and client agreements. Director Bilal offered fewer and more strategic references. His interests were in governance systems and risk management systems. This distribution shows that project teams are the primary reasons to mention contractual governance, yet it applies to all functional areas.

Theme 2: Relational Governance

Reational governance had emerged as a primary pillar in the operations of HVAC business especially in the HVAC industry of the Punjab. It is further noted that long-term success is usually influenced by personal and professional trust and relationships. Participants pointed out that although contracts give a formal structure, the quality of relations established through regular delivery to secure smooth collaboration and repeat business.

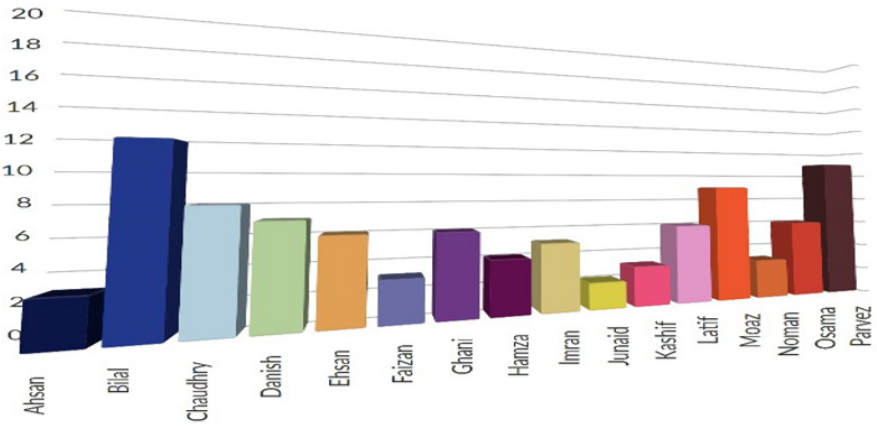


Figure 9: Theme 2: Relational Governance and Participants

Figure 9 indicates that theme 2 has varying degrees of participation among the respondents. Director Bilal and project manager Parvez made the most important contribution. They highlighted the importance of trust-based relationships and collective problem solving as a key to effective governance. Chaudhry, Kashif, and Moaz were also able to make contributions and present insights on cross-departmental coordination and stakeholder relationship management. The mid-level responses were obtained with Danish and Ehsan, who associated relational governance with project-specific negotiations and conflict resolution. Relational governance was briefly mentioned by the participants like Ahsan, Ghani and Imran only in the context of the other governance aspects as a facilitating factor. Overall, this indicates that whereas relational governance resonated well with some of the participants, it played a small role with others.

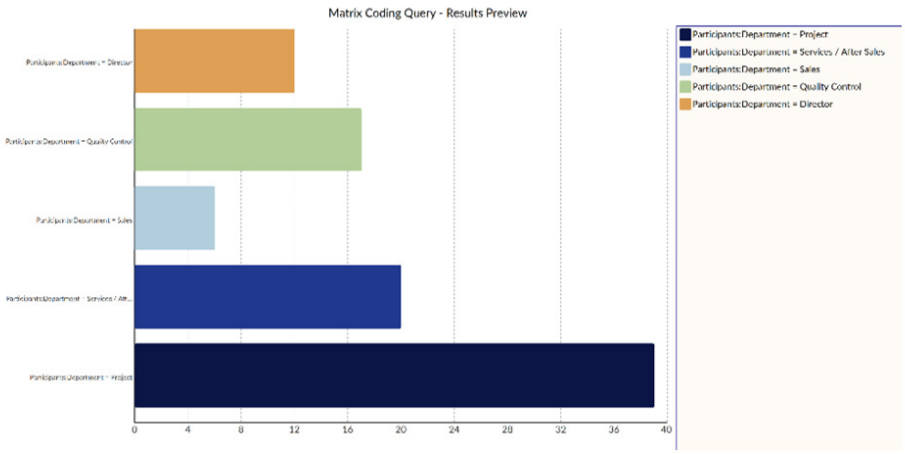


Figure 10: Theme 2: Relational Governance by Department

In Figure 10, relational governance was examined with a departmental affiliation where the project department was found to be the most crucial with 38 coded references. This demonstrates the importance of interpersonal trust, collaboration, and stakeholder relationships management in project implementation. Services/after sales department

members also contributed to high numbers by demanding on the importance of long-term relationships in customer service department. Quality control department bridged the linkage between relational governance and compliance governance and cross-functional coordination. The input of sales department into relations was minimal. The study cannot be generalized because it had a single participant in the sales department. The input of the director was relatively higher and provided strategic level insights on how to promote relationship-based governance.

Theme 3: Managerial Innovation

In the interviews, managerial innovation was referenced several times as a driver of the efficiency of contractual and relational governance in the HVAC industry in the Punjab, Pakistan. The respondents highlighted that managerial innovation incorporates the decision-making styles and the adaptive strategies that conform to the needs of clients and sustainability objectives. Managerial innovation offers the flexibility and vision needed to stay competitive in an industry in which antiquated practices are limiting the industry.

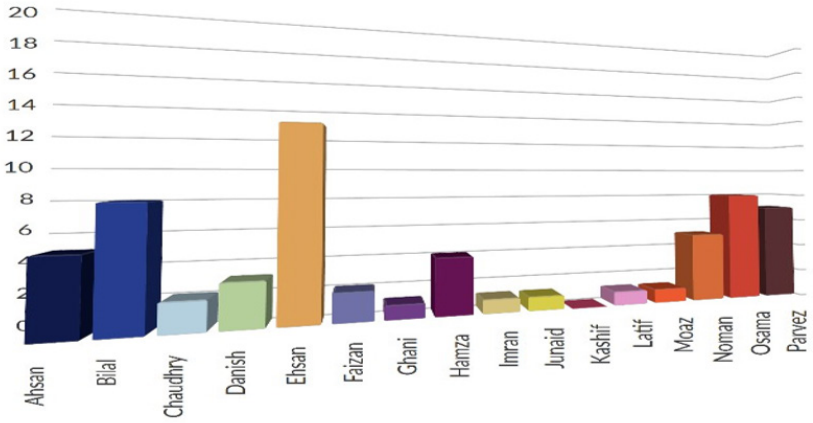


Figure 11: Theme 3: Managerial Innovation by Participant

Figure 11 indicates that the participants in managerial innovation have not contributed equally. Ehsan presented the greatest amount of references, talking about the various cases of creative approaches to leadership, adaptive management reactions, and innovative process development. Bilal, Osama, and Parvez also helped to contribute greatly because they shared their experience of applying managerial practices. Ahsan and Noman provided a moderate contribution, frequently relating innovation to improvements in efficiency and the specificity of the project. In some of the participants, such as Chaudhry, Danish, Faizan, Imran, Junaid, Kashif and Latif, the managerial innovation was less eminent. Overall, managerial innovation was an essential aspect to certain participants but was not yet pervasive to all.

In the case of managerial innovation, when analyzed by

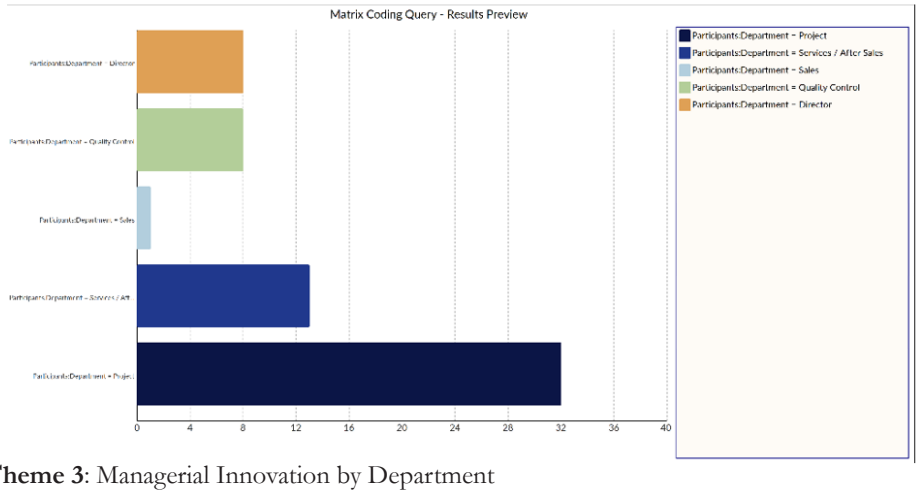


Figure 12: Theme 3: Managerial Innovation by Department

department, the project department came out as the most dominant source, with 32 coded references, as depicted in Figure 12. The analysis showed that the primary purpose of managerial innovation is planning and executing the projects. The services/after-sales department is the one that offered 13 references and emphasized their innovations in after-sales service processes. The six references in the quality control department connected innovation with refinement of processes and compliance amelioration. The eight references by director Bilal presented strategic insights into innovative culture in different departments. Sales contributed insignificantly and this means that they had little direct engagement with managerial innovation in their core duties.

Discussions

This research study identified six key themes—contractual governance, relational governance, managerial innovation, stakeholder involvement, sustainability, and project management practices—that collectively explain how governance mechanisms shape long-term sustainability in Punjab's HVAC industry. The findings demonstrate that contractual governance (addressing RQ1, RQ2, RQ3) provides essential legal and financial protection through clear contracts and risk management, yet suffers from non-standardized, often informal practices across the sector. Relational governance (addressing RQ4, RQ5, RQ6) emerges as equally critical, with trust, open communication, and relationship-building enabling flexibility, conflict resolution, and repeat business. Notably, a hybrid governance approach combining formal contracts with relational trust proves most effective for complex projects. Managerial innovation mediates this relationship by enabling adaptive decision-making, crisis adaptation, and technology adoption, while stakeholder involvement—particularly early engagement and active communication—ensures project alignment and reduces costly misunderstandings. The study concludes that long-term sustainability depends on operational excellence, quality after-sales services, market reputation, and regulatory compliance, with successful firms leveraging both governance types alongside skilled workforce development and robust supply chain management to thrive despite Pakistan's resource constraints and market instability.

CONCLUSION

This qualitative study examined how contractual governance and relational governance (independent variables), mediated by managerial innovation and stakeholder involvement, influence the long-term sustainability of HVAC firms in Punjab, Pakistan. The findings establish that both governance forms directly impact sustainability outcomes. Effective contractual governance facilitates successful project execution and after sales service delivery. Contracts that clearly define project scope and incorporate project specific risk management mechanisms enable managers to reduce conflicts, manage client expectations, and build stakeholder trust. Conversely, ambiguous or poorly drafted contracts generate delays, cost overruns, and operational errors, which currently undermine the sustainability of many HVAC businesses. Moreover, the absence of standardized contractual practices means that contract terms are largely client driven. Therefore, the researcher strongly recommends adopting standardized contract templates that are tailored to address project specific risks, thereby enhancing quality performance, after sales support, and financial sustainability. Relational governance proves equally important. While contracts provide legal protection, relational governance ensures smooth execution of contractual obligations and fosters client trust. Interview data indicate that trust, honesty, and proper communication are key to successful project implementation and conflict resolution. Trust based relationships minimise resistance to change, encourage innovation, and secure active stakeholder involvement. In Punjab's HVAC industry, strong client relationships translate into repeat business and positive referrals, which directly support long term success. Managerial innovation emerges as a critical mediating factor that enhances both contractual and relational governance. Businesses that adopt adaptive and innovative management approaches are better equipped to handle challenges such as scope changes, supply chain disruptions, and shifting client demands. For small and medium sized HVAC firms, managerial innovation offers a pathway to navigate market uncertainties and regulatory changes, enabling sustained competitiveness in Punjab's competitive market. Stakeholder involvement similarly functions as a powerful mediator. Early engagement, transparent communication, and active expectation management are essential for successful project implementation. Active stakeholder participation reduces risks, delays, and cost overruns while ensuring that client requirements are met. It also generates repeat business through client satisfaction and new business through positive word of mouth, directly contributing to long term viability. Finally, sustainability in Punjab's HVAC sector depends on timely delivery of quality projects, regulatory compliance, superior after sales service, and client satisfaction. Market reputation is the most critical asset; a firm perceived as reliable and competent is far more likely to grow and flourish. For complex projects, the researcher recommends a hybrid governance approach that combines contractual and relational governance. Together, contract clarity, strong relationships, and managerial innovation minimise risks, increase efficiency, and build lasting client relationships, allowing HVAC firms to remain competitive and sustain growth in a developing economy such as Punjab.

Research Limitations

Several limitations affect the validity and generalisability of the findings. First, the use of interviews introduces potential participant bias, as respondents may provide answers influenced by social desirability or personal biases. Second, the sample comprised only sixteen individuals from three successful HVAC firms in Punjab, which may not fully represent the entire HVAC industry in Pakistan. Third, the study's exclusive focus on Punjab restricts the extrapolation of results to other regions of Pakistan or to other industries, both domestically and internationally.

Recommendations for Practice

Based on the strategies employed by successful HVAC organizations in Punjab, the following recommendations aim to enhance market position and long term success. HVAC companies in Punjab can optimize operational performance and promote sustainability by establishing a Project Governance Office (PGO). The PGO would integrate contract management, stakeholder

engagement, training, and performance monitoring to achieve consistency and alignment. Key functions of the PGO should include: Developing consistent, project oriented contracts that minimise misinterpretation, enhance clarity, and address project specific risks, thereby preventing execution phase misunderstandings and delays. Implementing uniform communication standards to introduce transparency and build confidence among all stakeholders. Providing ongoing training in new technologies, regulatory compliance, client communication, and conflict resolution, ensuring that managerial innovation meets new market demands. Involving clients, suppliers, and contractors in the initial planning stage to manage expectations and mitigate conflict risks. Establishing a fully functional compliance, performance, and quality monitoring system to ensure organisational sustainability and business success. Creating a roadmap for digitalising contracts and service processes to improve efficiency, responsiveness, and effectiveness. Building long term client relations through predictive maintenance, troubleshooting, and energy saving solutions, which enhance equipment performance, efficiency, and client satisfaction, leading to repeat business and referrals. Developing positive, healthy relationships with suppliers to ensure efficient procurement operations and mitigate supply chain disruption risks. Offering periodic maintenance packages and energy assessments to maintain high customer satisfaction, extend HVAC equipment life, optimise energy use, and reduce expensive repair costs. Through the creation of a PGO, HVAC businesses can integrate all findings into a single, homogeneous operational framework. With these strategic suggestions and a sustained emphasis on quality, HVAC companies can remain competitive and expand in Punjab's evolving market.

Recommendations for Policymakers

To promote sustainability, reduce costs, and improve operational efficiency in the HVAC sector of developing economies like Punjab, policymakers should consider the following actions: Enact regulations focused on energy efficiency and sustainable practices. Provide incentives for customers who adopt energy efficient HVAC equipment and renewable energy solutions, thereby encouraging environmental sustainability. Establish training programs that teach professionals current HVAC technologies and energy efficient solutions, recognising that technology evolves rapidly. Introduce green financing schemes for small HVAC businesses to lower initial costs and support sustainability efforts. Promote research and development by encouraging partnerships between academic institutions and the HVAC industry.

Future Research Recommendations

Future research should compare governance, innovation, and sustainability practices across HVAC businesses in different regions and countries. The lack of standardised contracts in Punjab's HVAC industry was identified as a severe problem affecting efficiency, stakeholder reliability, and governance. Further research should focus on A standardised contractual framework tailored to Punjab's HVAC industry should be constructed and tested. This is a priority because standardised contracts will enhance operational efficiency, reduce conflicts, and instill stakeholder confidence. Investigate how the roles of contractors, clients, and suppliers evolve during HVAC projects. Understanding these dynamic interactions over project life cycles can improve teamwork, communication, and project outcomes. Determine how third party consultants affect contract standardization, conflict management, and relational trust in HVAC projects. Such research would provide concrete insights into improving cooperation and execution. Compare HVAC businesses in Punjab with those in developed nations to identify best practices in governance models, contractual standards, and sustainability strategies. This broader orientation can help transform Punjab's HVAC industry into a globally competitive sector. Examine the role of managers' emotional intelligence in promoting better decision making, cooperation, and conflict management, thereby improving governance practices.

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