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BUILDING CODES IN RURAL AREAS OF PAKISTAN

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Abstract

Building codes are an established strategy for ensuring safe and hygienic construction. These codes' development, adoption by the local councils, enforcement, and cyclic improvement are all substantial in a resilient built environment. Illustriously, the literature review indicates lacunas in building codes in Pakistan, especially in rural areas. The natural disasters and evident climate change in Pakistan are significant threats to Pakistan's built environment. The primary aim of this study is to investigate the effectiveness of building codes, the challenges faced by building codes, and the venues for improvement for code compliance in rural areas of Pakistan. A qualitative approach was adopted by developing a survey instrument targeting the randomly selected built environment professionals. The responses were analyzed using SPSS V24 for reliability and triangulation of the observed variables and leading constructs. The study's findings demonstrate that the development of building codes, their adoption and enforcement by the local councils, and monitoring need improvement. Furthermore, the study findings suggest that the inclusivity of architects, planners, and code officials in the development of building codes has the ability to bring resilience to the built environment in rural areas of Pakistan.

***Keywords**:* building codes, resilient, built environment, rural areas

INTRODUCTION

The building codes are a set of rules for regulating construction activity in a specified region. They cover essential criteria for building in conformity with administrative control. According to Ching and Winkel (2019), these codes are the rules on how buildings should be planned and constructed considering health, safety, and quality measures. The building codes are reference instruments used by architects, engineers, developers, and the general public to observe buildings' safety, health, and welfare (Spivack, 2016). Torgal & Jalali (2012) trace the history of building codes to Babylon, where the ruler Hammurabi imposed a death sentence on the builders whose structures crumbled. The famous Rebuilding of London Act of 1666 declared fire resistance in buildings mandatory. The American Insurance Association, in 1905, developed the first national-level building code forming the base for current building regulations. The International Conference of Building Officials (ICBO) was formed in 1922, and they developed the first Uniform Building Code in 1927. The American Building Code (BOCA National Building Code) of the 1950s is a milestone in standardization and regulation in construction.

The International Code Council (ICC) was formed in the 1990s, resulting in the formulation of the International Building Code in 1997, and continues developing versions of these building codes. The International Building Code (IBC) was a result of blending the Standard Building Code, BOCA National Building Code, and Uniform Building Code. In addition, there are several other standards and codes like Applied Technology Council (ATC), the American National Standards Institute (ANSI), the American Society for Testing and Materials (ASTM), the American Institute of Steel Construction (AISC), American Society of Civil Engineers (ASCE), and American Concrete Institute (ACI), etc. These platforms issue standards for particular applications used as a reference by diverse organizations and codes globally.

Codes have been a primary element governing the planning process, design, and construction for a long time. The building codes are developed by the government or semi-government bodies and are enforced all over a region. In contrast, codes' development, approval, and compliance vary from country to country (Ching & Winkel, 2019). According to Aboulnaga and Mostafa (2019), the primary goal of building bylaws is to achieve minimum safety, general welfare, and health of the inhabitants of a building. These regulations are expected to encompass exterior envelop, wall assemblies, foundations, room sizes, roofing, stair design, mechanical and electrical systems, lighting, drainage, and plumbing.

Generally, local governments regulate construction using a model building code system. When municipalities adopt these codes, they attain a legal status within their jurisdiction and become regulations called "adoption by reference" (Ornelas, Guedes, and Breda, 2016). Local governments sometimes

develop building construction codes, usually with prescriptive and performance-based requirements. The prescriptive code method relies on fixed design values based on empirical data, whereas the performance-based codes require performance from particular elements (Moore, 2013). These codes are the minimum allowable norms outlining all construction and demolition in the construction industry. The professionals must realize the language of these codes for designing three-dimensional components of a structure. Architects and engineers must apply these codes to their design for construction permits before the execution of work (Spivack, 2016).

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All construction and development must conform to the codes once adopted by a municipality or local council. The district councils issue the construction permit in Pakistan submitted by the PCATP registered architects to the municipal agency. There are several layers of local boards in Pakistan, like the Lahore Development Authority, Peshawar Development Authority, Defence Housing Authorities, municipal/ metropolitan Corporations, and cantonment boards. Usually, these agencies have their set of planning bylaws to address building planning, floor-to-area ratio, building height, car parking, etc. Apart from issuing a building permit, these agencies are also responsible for inspecting the building construction. There are two sets of regulations; one is the building bylaws, and the other is building codes. The municipalities can develop their separate building bylaws while the Pakistan Engineering Council develops the construction codes empowered through section 25 of the PEC Act of 1975 (Muhammad, 2022).

The Pakistan Engineering Council has developed numerous codes, including the Pakistan Occupational Health and Safety Act 2018 (Draft), the Building Code of Pakistan-Fire Safety Provisions 2016, the Pakistan Electric and Telecommunication Safety Code 2014, the Building Code of Pakistan-Energy Provisions 2011, and the Building Code of Pakistan, Seismic Provisions 2007. Building construction on a specific scale and location must follow codes and laws, including the Disaster Risk Reduction Policy of 2013, the Pakistan Environmental Protection Act of 1997, The Factories Act of 1934, and The Mines Act of 1923. However, since the promulgation of provincial autonomy through the 18th amendment, the legal edifice of these national-level building codes remains ambiguous. Usman and Ibrahim (2016) state that building codes are not mandatory in Pakistan and lack adoption by local governments. Until now, none of the local councils has announced the adoption of these codes, which indicates legal, regulatory, technical, institutional, and financial barriers. Additionally, including relevant stakeholders in the code development process is a staunch distress amongst architects, planners, and developers (Ahmad, 2022).

The unplanned, illegal, unsafe, and unhygienic construction in Pakistan is a significant concern for built environment professionals (Ebrahim, 2022; Farid

et al., 2020). According to Rizwan (2021) and Ebrahim (2022), most of the buildings in rural areas of Pakistan are damaged due to earthquakes and natural disasters, causing the loss of human lives, livestock, and resources. International Code Council affirms that building codes play a significant role in protection from manmade and natural disasters. After the 2005 earthquake, the problem of inadequacy in building codes of Pakistan was recognized by experts (Maqsood & Schwarz, 2010; Haseeb et al., 2011). It was also noted that most of the donors for reconstruction were disinclined to fund the reconstruction due to building code enforcement. Spence et al. (2003) explain that the defects in buildings are due to the failure to achieve standards, while the lack of safety measures was also evident in most facilities (Deakin, 1999). Researchers claim that building failure is associated with the absence of building codes and regulations and their enforcement.

RESEARCH METHODOLOGY

This study utilized a quantitative approach for collecting primary data by administering a survey questionnaire research technique. Researchers like Creswell (2009), Hoxley (2008), Leishman (2008), Naoum (2019), and Wang and Hofe (2008) recommend that surveys are an effective tool in the study of infrastructure and the built environment as it provides a descriptive explanation of trends, attitudes, and opinion of the target population. They further suggest that the surveys are used in cross-sectional research to derive data for generalization from a sample of the target population. The survey instrument uses close-ended questions with fixed alternatives (Dawson, 2011) to record the response in less time and be simpler for the subjects (Oppenheim, 1992). The instrument spans four leading constructs comprising 25 questions herein called Observed Variables using the Likert Scale from one (1) to five (5). Collecting information from licensed architects on building codes in Pakistan was the survey's primary objective hence called the population numbering 5007, and the sample size is derived to 136.

Table 1: Composition of the Questionnaire

Section	Leading Construct	Observed Variables
A	Profile of Respondents	Work Experience
B	Building Codes in Pakistan	Building Construction
C	Challenges in Building Codes	
D	Improvement in Building Codes	

The instrument was distributed randomly among PCATP-registered architects through an online platform (google forms). The architects were sent emails of the link and were further contacted after a week. The questionnaire was

statistically tested in SPSS V24 to establish its reliability and triangulation. The result of reliability is illustrated in the table below.

Table 2: Reliability of the Instrument

Leading Construct	No. of Indicator	Cronbach's Alpha
Profile of the Respondents	1	N.A
Building Codes in Pakistan	11	0.873
Challenges in Building Codes	8	0.942
Improvement in Building Codes	5	0.934

FINDINGS AND DISCUSSION

Demographic Statistics

The survey indicated that 58 percent of the respondents have more than ten years of professional experience. Only 19 percent of the respondents had less than five years of experience, increasing the possibility of professionally seasoned responses.

Table 3: Profile of the respondents

No.	Category	Frequency	Percentage (%)
1	**Work Experience**		
	1 year to 5 years	26	19
	6 years to 10 years	31	23
	11 years to 15 years	26	19
	16 years to 20 years	29	21
	More than 20 years	24	18

Analyzing the Effectiveness of Building Codes in Pakistan

According to the literature, the effectiveness of building construction standards in Pakistan can be measured by the regulatory and normative aspects indicated by eleven (11) observed variables. Table 4 illustrates that "Planning, infrastructure, and building standards" are ineffective, with 75% of negative responses and mean value less than. Variable BCS-2 "Building Standards and Codes" was declared ineffective by 75% negation with a mean value of 2.09. BC-3 "Local building Byelaws and Regulations" was scored negative, receiving 78% ineffective and sometimes effective responses with a mean value of 2.07. BCS-4 "Technical Requirements for buildings" got a 78% response negative with a mean value of 1.97. BCS-5 "National Reference Manual on Planning and Infrastructure Standards 1986" received a 77.6% negative response, and its mean value is 1.85. BCS-6 "Building Code of Pakistan (Seismic Provisions 2007)" was regarded negatively by 79.7% of the respondents, whose mean value comes to 2.11. BCS-7 "Building Code of Pakistan (Energy Provisions 2011)" was rated as unfavorable by 83.8% of the respondents, while its mean value ranges less than 2.6. BCS-8 "National Climate Change Policy 2012" is declared ineffective by

89.7% of the respondents, and the mean value comes to 1.89. BCS-9 "Disaster Risk Reduction Policy 2013" was rated ineffective by 86% of the respondents, whose mean value is 1.90. BCS-10 "Pakistan Electric and Telecommunication Code 2014" was given negative by 83% of responses while the mean value is 1.96.

Similarly, BCS-11, "Building Code of Pakistan (Fire Safety Provisions 2016)," received 83.8% negative remarks, while its mean value is 1.88. In brief, all the existing building construction standards in rural areas of Pakistan are declared ineffective by the majority of the architects and executing agencies. This result is supported by the literature and confirms that the existing construction in rural areas of Pakistan is weak regarding the standards and codes.

Table 4: Responses for Effectiveness of Building Codes in Pakistan

Code	Observed Variables	Frequency	Percent
BCS-1	**Planning, infrastructure, and building standards**		
	Not effective	37	27.2
	Sometime effective	66	48.5
	Frequently effective	31	22.8
	Most effective	1	0.7
	Always effective	1	0.7
BCS-2	**Building Codes**		
	Not effective	25	18.4
	Sometime effective	77	56.6
	Frequently effective	31	22.8
	Most effective	3	2.2
	Always effective	-	-
BCS-3	**Local Building Byelaws and Regulations**		
	Not effective	27	19.9
	Sometime effective	79	58.1
	Frequently effective	25	18.4
	Most effective	4	2.9
	Always effective	1	0.7
BCS-4	**Technical Requirements for buildings**		
	Not effective	38	27.9
	Sometime effective	69	50.7
	Frequently effective	25	18.4
	Most effective	3	2.2
	Always effective	1	0.7
BCS-5	**National Reference Manual on Planning & Infrastructure Standards 1986**		
	Not effective	40	29.4
	Sometime effective	82	60.3
	Frequently effective	9	6.6
	Most effective	4	2.9

	Always effective	1	0.7
BCS-6	**Building Code of Pakistan (Seismic Provisions 2007)**		
	Not effective	23	16.9
	Sometime effective	84	61.8
	Frequently effective	20	14.7
	Most effective	9	6.6
	Always effective	-	-
BCS-7	**Building Code of Pakistan (Energy Provisions 2011)**		
	Not effective	24	17.6
	Sometime effective	90	66.2
	Frequently effective	13	9.6
	Most effective	8	5.9
	Always effective	1	0.7
BCS-8	**National Climate Change Policy 2013**		
	Not effective	35	25.7
	Sometime effective	87	64.0
	Frequently effective	9	6.6
	Most effective	4	2.9
	Always effective	1	0.7
BCS-9	**Disaster Risk Reduction Policy 2013**		
	Not effective	39	28.7
	Sometime effective	78	57.4
	Frequently effective	13	9.6
	Most effective	5	3.7
	Always effective	1	0.7
BCS-10	**Pakistan Electric and Telecommunication Code 2014**		
	Not effective	35	25.7
	Sometime effective	78	57.4
	Frequently effective	17	12.5
	Most effective	5	3.7
	Always effective	1	0.7
BCS-11	**Building Code of Pakistan (Fire Safety Provisions 2016)**		
	Not effective	43	31.6
	Sometime effective	71	52.2
	Frequently effective	18	13.2
	Most effective	4	2.9
	Always effective	-	-
	TOTAL	**136**	**100**

Table 5: Mean Values of Building Codes in rural areas of Pakistan

Observed variables	Mean	Std. Dev.	N
(BCS-1) Planning, infrastructure, and building standards	1.99	0.775	136
(BCS-2) Building Codes	2.09	0.704	136
(BCS-3) Local Building Byelaws and Regulations	2.07	0.752	136
(BCS-4) Technical Requirements for buildings	1.97	0.788	136

(BCS-5) National Reference Manual on Planning & Infrastructure Standards 1986	1.85	0.726	136
(BCS-6) Building Code of Pakistan (Seismic Provisions 2007)	2.11	0.757	136
(BCS-7) Building Code of Pakistan (Energy Provisions 2011)	2.06	0.758	136
(BCS-8) National Climate Change Policy 2013	1.89	0.706	136
(BCS-9) Disaster Risk Reduction Policy 2016	1.90	0.769	136
(BCS-10) Pakistan Electric & Telecommunication Code 2014	1.96	0.774	136
(BCS-11) Building Code of Pakistan (Fire Safety Provisions 2016)	1.88	0.745	136

It was also considered necessary to examine the relationship between the building standards and codes. From the Pearson correlation, it can be observed that BCS-6, "Building Code of Pakistan (Seismic Provisions 2007)", has a weak relationship with BCS-1, BCS-2, BCS-3, and BCS-4. BCS-7 "Building Code of Pakistan (Energy Provisions 2011)" have a weak relationship with BCS-2 and BCS-3. BCS-9 "Disaster Risk Reduction Policy 2013" has a weak relationship with BCS-2 and BCS-3. The most significant correlation is found between BCS-8 and BCS-9, BCS-8 and BCS-10, BCS-9 and BCS-10, BCS-10 and BCS-11

Table 6: Correlation of the observed variables for building codes in rural areas of Pakistan

	BCS-1	**BCS-2**	**BCS-3**	**BCS-4**	**BCS-5**	**BCS-6**	**BCS-7**	**BCS-8**	**BCS-9**	**BCS-10**	**BCS-11**
BCS-1	**1**										
BCS-2	.463**	**1**									
BCS-3	.458**	.534**	**1**								
BCS-4	.497**	.418**	.428**	**1**							
BCS-5	.394**	.185*	.235**	.355**	**1**						
BCS-6	.014	0.023	0.065	0.068	.461**	**1**					
BCS-7	.215*	0.155	0.123	.288**	.595**	.583**	**1**				
BCS-8	.256**	.228**	.195**	.393**	.561**	.439**	.635**	**1**			
BCS-9	.198*	0.153	0.062	.313**	.493**	.578**	.723**	.717**	**1**		
BCS-10	.346**	.210*	0.119	.338**	.479**	.437**	.673**	.711**	.716**	**1**	
BCS-11	.204*	.177*	0.160	.233**	.473**	.511**	.621**	.621**	.704**	.712**	**1**

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)

Analysing Challenges faced by the Building Codes in rural areas of Pakistan

The leading construct of challenges in building construction standards and regulations contains eight (8) observed variables. The observations collected from the field are presented in the table above, illustrating the severe challenges. The mean value table explicitly shows that there is a severe lack of standards and regulations on a national, provincial, and local level, a lack of product

certification, a mismatch between national standards and standards for imported materials, and a lack of awareness, finance, and monitoring and enforcement.

Table 7: Responses for Challenges faced by the building codes in rural areas of Pakistan

Code	Observed Variables	Frequency	Percent
BCR-1	**Lack of national/provincial/local buildings standards**		
	None	3	2.2
	Very Mild	14	10.3
	Mild	28	20.6
	Moderate	59	43.4
	Severe	32	23.5
BCR-2	**Lack of national/provincial/local building regulations**		
	None	3	2.2
	Very Mild	14	10.3
	Mild	31	22.8
	Moderate	61	44.9
	Severe	27	19.9
BCR-3	**Lack of Product certification in the market**		
	None	5	3.7
	Very Mild	18	13.2
	Mild	26	16.1
	Moderate	45	33.1
	Severe	42	30.9
BCR-4	**Mismatch between national standards and standards of imported material**		
	None	4	2.9
	Very Mild	17	12.5
	Mild	24	17.6
	Moderate	52	39.2
	Severe	39	28.7
BCR-5	**Lack of experts/ expertise**		
	None	4	2.9
	Very Mild	16	11.8
	Mild	33	24.3
	Moderate	43	31.6
	Severe	40	29.4
BCR-6	**Lack of awareness**		
	None	2	1.5
	Very Mild	17	12.5
	Mild	55	40.4
	Moderate	37	27.2
	Severe	25	18.4
BCR-7	**Lack of finance**		
	None	3	2.2

	Very Mild	15	11.0
	Mild	30	22.1
	Moderate	62	45.6
	Severe	26	19.1
BCR-8	**Monitoring and Enforcement**		
	None	3	2.2
	Very Mild	14	10.3
	Mild	17	12.5
	Moderate	63	46.3
	Severe	39	28.7
	TOTAL	**136**	**100**

Table 8: Mean Values for Challenges faced by the building codes in rural areas of Pakistan

Observed Variables	Mean	Std. Dev.	N
(BCR-1) Lack of national/provincial/local buildings standards	3.76	1.000	136
(BCR-2) Lack of national/provincial/local building regulations	3.70	0.976	136
(BCR-3) Lack of Product certification in the market	3.74	1.142	136
(BCR-4) Mismatch between national standards and standards of imported material	3.77	1.088	136
(BCR-5) Lack of experts/ expertise	3.99	0.911	136
(BCR-6) Lack of awareness	3.84	1.005	136
(BCR-7) Lack of finance	3.94	0.980	136
(BCR-8) Monitoring and Enforcement	3.73	1.099	136

As mentioned in the table below, a Pearson correlation was drawn to determine the correlation among these variables. The correlation coefficient indicates that there is a significant correlation between all the variables; however, BCR-1 "Lack of building standards on a national, provincial and local level," BCR-2 "Lack of building regulations on the national, provincial and local level," BCR-3 "Lack of product certification in the market" and BCR-4 "Mismatch between national standards and standards for imported materials" establishes the most prominent correlation with each other.

Table 9: Correlation of the observed variables of challenges faced by the building codes

	BCR-1	**BCR-2**	**BCR-3**	**BCR-4**	**BCR-5**	**BCR-6**	**BCR-7**	**BCR-8**
BCR-1	**1**							
BCR-2	.812**	**1**						
BCR-3	.834**	.787**	**1**					
BCR-4	.827**	.806**	.775**	**1**				
BCR-5	.533**	.524**	.558**	.518**	**1**			
BCR-6	.423**	.378**	.350**	.389**	.501**	**1**		
BCR-7	.451**	.396**	.424**	.439**	.539**	.492**	**1**	
BCR-8	.495**	.575**	.548**	.550**	.528**	.474**	.452**	**1**

**. Correlation is significant at the 0.01 level (2-tailed)

Analysing Improvement in Building Codes in rural areas of Pakistan

After realizing the effectiveness of building construction standards and their challenges, it is vital to understand the measures for improvement. Based on the literature review, this leading construct is developed to look at the remedial actions to improve it. The construct contains five observed variables evolved from the literature study. From the table above, it is noticeable that all these five measures naming IBS-1 "Harmonize some priority building standards," IBS-2 "Develop guiding document of good practices on monitoring and enforcement of building standards," IBS-3 "Develop minimum acceptable standards for adequate & healthy built environment Planning," IBS-4 "Establish a provincial platform to develop, collect and analyze housing standards" and IBS-5 "Establish a database and network of experts in the area of building standards by province and by field" are rated by the respondents as severely critical giving more than 70% of the affirmation. It is illustrated by the mean value table mentioned below, with a mean value of approximately 4.

Table 10: Responses for Improvement in building codes in rural areas of Pakistan

Code	Observed Variables	Frequency	Percent
IBS-1	**Harmonize some priority building material standards**		
	None	-	-
	Very Mild	5	3.7
	Mild	28	20.6
	Moderate	61	44.9
	Severe	42	30.9
IBS-2	**Develop a guiding document of good practices for monitoring and enforcement**		
	None	1	0.7
	Very Mild	9	6.6
	Mild	19	14.0
	Moderate	69	50.7
	Severe	38	27.9
IBS-3	**Develop minimum acceptable standards for adequate & healthy built environment planning**		
	None	-	-
	Very Mild	9	6.6
	Mild	19	14.0
	Moderate	65	47.8
	Severe	43	31.6
IBS-4	**Establish a regional platform to develop, collect and analyze housing standards**		
	None	1	0.7
	Very Mild	14	10.3
	Mild	17	12.5
	Moderate	62	45.6
	Severe	42	30.9

IBS-5	**Establish a database and network of experts in the area of building standards by province and by field**		
	None	-	-
	Very Mild	10	7.4
	Mild	23	16.9
	Moderate	56	41.2
	Severe	47	34.6
	TOTAL	**136**	**100**

Table 11: Mean Values for Improvement in building codes in rural areas of Pakistan

Construct	Mean	Std. Dev.	N
IBS-1	4.03	0.816	136
IBS-2	3.99	0.869	136
IBS-3	4.04	0.851	136
IBS-4	3.96	0.957	136
IBS-5	4.03	0.902	136

From the above responses, it is evident that all the variables in measures to be taken for improving building standards and their effectiveness are equally essential. As exhibited below, Pearson correlation was calculated to reinforce their relationship using SPSS V 24. According to the correlation table, all the variables bear significant correlations amongst each other, with values exceeding .690 positively.

Table 12: Correlation of the observed variables for improvement in building codes

	IBS-1	IBS-2	IBS-3	IBS-4	IBS-5
IBS-1	**1**				
IBS-2	.774**	**1**			
IBS-3	.745**	.732**	**1**		
IBS-4	.770**	.818**	.694**	**1**	
IBS-5	.753**	.690**	.741**	.748**	**1**

**. Correlation is significant at the 0.01 level (2-tailed).

Correlating Dynamics of Building Codes in Pakistan

A Pearson Correlation coefficient was analyzed through SPSS V24 in the following table to develop a deeper understanding of the three dimensions of building standards and regulations. Interestingly, the Challenges have a strong and positive correlation with the improvement, while the other two are significant but negative.

Table 13: Correlation of the leading constructs

	Challenges in Building Codes	Effectiveness of Building Codes	Improvement in Building Codes
Challenges in Building Codes	**1**		
Effectiveness of Building Codes	-.217*	**1**	
Improvement in Building Codes	.647**	-.231**	**1**

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

This study identifies the vital factors to determine the quality, minimum safety, and health standards in buildings. Codes are the essential source and a regulatory instrument to guide planning, design, and construction. The study of building codes in Pakistan is divided into three leading constructs: effectiveness of building codes, challenges to building codes, and improvement in building codes. Similarly, the results suggest that the effectiveness of the building construction standards in rural areas of Pakistan lacks the adoption of standards and building codes by the municipalities. The survey findings illustrate that local bylaws, regulations, and municipality technical requirements are not followed. There is one standard for planning called the National Reference Manual on Planning and Infrastructure Standards, developed in 1986, while several other building codes like the Seismic code of 2007, Energy code of 2011, Climate Change policy of 2012, Disaster Risk reduction policy of 2013, Electric and telecom code of 2014 and Fire Safety provisions of 2016. Implementing these codes is not committed by any municipality in rural areas of Pakistan. This result is in line with the findings from the literature review.

The results indicate numerous challenges, including a lack of building standards, building regulations, product certification, experts, knowledge, and finance, and the mismatch between local and imported materials standards. The survey also revealed that monitoring and enforcement are facing severe challenges. Furthermore, the results explain that the measures to be taken to improve building standards and their effectiveness include developing a good practice guidance document, minimum performance standards, a regional platform for standards, and a national expert database on building standards. The study displays that all of these areas need severe attention for the resilient rural communities of Pakistan. Additionally, it relates to Improving the building code development, application, and enforcement concerns for transforming the legal interface and bringing health and safety to citizens.

Lastly, the results demonstrate that Pakistan's building codes are insufficient in their development, adoption by municipalities, enforcement, and

compliance. It is parallel with the literature review conducted in the study. The results of this study support the findings and constructs from the previous works that have confirmed that there is a deficit in the adoption of building standards and regulations by the municipalities, a lack of technical cadres on a local level, and weak monitoring and evaluation system in Pakistan.

CONCLUSION

In recent years, has been a growing concern that the construction in rural areas of Pakistan does not follow the building codes. Building codes are a primary ingredient for achieving resilience in the built environment which relies on adopting a comprehensive strategy for engaging public and private sectors in building construction. Moreover, data were collected from respondents, mainly architects, planners, and engineers, through a survey instrument to investigate the dimensions. Findings from this study present the dimensions to be embraced by policymakers, PEC, PCATP, architects, planners, and engineers in achieving enforcement and adoption of the building codes in rural areas of Pakistan. Additionally, it is evident that all researches contain limitation(s), and this endeavor is not an exception. Therefore, in this study, data were collected from 136 subjects, where the sample size is acceptable for empirical study; however, data collection from more subjects to enhance the robustness and validity of the statistical results. In addition, the sphere of the population can be extended to city councils, local administration, and code enforcement agencies will improve the generalization of the results accordingly.

RECOMMENDATION

As a result, identifying strategies for future risks and code development supportive of risk adoption is required. Apart from that, cooperation on risk resilience guidelines and exploring the rapport with spatial planning for better and safe zoning. It is essential to enhance awareness of building codes and understanding of risk to the policymakers, the general public, and building construction stakeholders. Similarly, assistance for research on climate science, aligning resilience, and building construction with future disasters shall be provided. Improving risk and impact analysis to realize social and economic benefits through investment in resilience is imperative. Moreover, professionals from the building construction industry shall work with climatologists, regulators, and policymakers to establish an appropriate, authoritative and reliable methodology to address climate risks.

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Appendix (Questionnaire Items)

SECTION A: GENERAL INFORMATION

In this section, please tick only one box for each of the questions

Q1. Please state your profession:
Architect [ ] Engineer [ ] Developer [ ]

Q2. How long have you been working with your planning authority?
1-5years [ ] 6-10years [ ] 11-15 years [ ] 16-20years [ ] more than 20 years

SECTION B: BUILDING CODES IN PAKISTAN

Q1. In your opinion, please rate the effectiveness of building construction standards in rural areas.

1- Not effective, 2- sometimes effective, 3- frequently effective, 4- mostly effective, 5- always effective

		1	2	3	4	5
1	Planning, infrastructure, and building standards					
2	Building standards and codes					
3	Local Building Byelaws and Regulations					
4	Technical requirements for buildings					
5	National Reference Manual on Planning & Infrastructure Standards 1986					
6	Building Code of Pakistan (Seismic Provisions 2007)					
7	Building Code of Pakistan (Energy Provisions 2011)					
8	National Climate Change Policy 2012					
9	Disaster Risk Reduction Policy 2013					
10	Pakistan Electric and Telecommunication Code 2014					
11	Building Code of Pakistan (Fire Safety Provisions 2016)					

SECTION C: CHALLENGES FACED BY BUILDING CODES

Q2. Please rate the major challenges in construction codes that the building sector faces in rural areas.

1-None, 2-Very Mild,3- Mild,4- Moderate, 5-Severe

		1	2	3	4	5
1	Lack of national/ Provincial/ Local building standards					
2	Lack of national/ Provincial/ Local building regulations					
3	Lack of product certification in the market					
4	The mismatch between national standards and standards for imported materials					
5	Lack of experts/expertise					
6	Lack of awareness					

7	Lack of finance					
8	Monitoring and Enforcement					

SECTION D: IMPROVEMENT IN BUILDING CODES

Q3. In your opinion, please indicate the measures to improve building codes and their effectiveness.

1-None, 2-Very Mild,3- Mild,4- Moderate, 5-Severe

		1	2	3	4	5
1	Harmonize some priority building materials standards					
2	Develop a guiding document of good practices for monitoring and enforcement					
3	Develop minimum acceptable standards for adequate and healthy built environment planning					
4	Establish a regional platform to develop, collect and analyze housing standards					
5	Establish a database and network of experts in the area of building standards by country and by field					

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