# Investigating Barriers and Problems affecting the Standardization of Industrial Construction Materials of Lorestan Province (With an Emphasis on Concrete and Concrete's Aggregates)

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## 1. Introduction

According to Articles 155 and 168 of the Fifth Development Plan Law, any construction must be carried out with standard materials and its application by competent builders, and each building must be insured for ten years. Accordingly, the main purpose of this study is to investigate the barriers and problems affecting the standardization of construction materials in Lorestan province. The research method in this research was quantitative-qualitative (mixed) of exploratory type. In this method, the research team first developed a questionnaire including open-ended questions according to the objectives and questions of the research. After compiling the questionnaire and selecting the panel members, the interviews began. At this stage, fifty managers of material production centers, employers, experts of the provincial engineering organization, urban housing, standard administration, executives, and supervisors of construction projects were coordinated and interviews were conducted. The sample size was so saturated that the interviews in this section were saturated with fifty people and in the quantitative section it was a random sampling method in which three hundred and twenty-five manufacturers, consumers, supervising engineers, laboratory testers using Cochran's formula. Colleagues and contractors were examined. To collect information in this study, in-depth interviews, questionnaires, field observations, and experiments (obtaining the results of forty samples of tests performed by accredited laboratories by the General Directorate of Standards in the province and analyzing these tests based on existing standards) have been used.

## 2. Method

In this study, because there were no measuring tools to investigate the obstacles and problems affecting the standardization of building materials the obstacles and problems as well as solutions to overcome these obstacles were unknown. Qualitative) has used the exploratory type. In this method, the research team first developed a questionnaire including open-ended questions according to the objectives and questions of the research. After making the questionnaire and selecting the panel members, the interviews began. At this stage, coordination and interviews were conducted with 50 managers of material production centers, contractors, experts of the provincial engineering system organization, urban housing, the General Directorate of Standards, executors, and supervisors of construction projects, and partner laboratories. (It should be noted that the reason for the sample size of 50 people at this stage was due to the saturation of the interviews).

## 3. Content validity ratio index

This indicator is designed by Lavoshe. To calculate this index, the opinions of experts in the field of the content of questionnaire were used and by explaining the objectives of the test to them and providing them with operational definitions related to the content of the questions, they were asked to rate each question according to the Likert scale such as: "Item is necessary", "item is useful but not necessary" and "item is not necessary". Based on the number of professionals who evaluated the questions, the minimum acceptable CVR should be based on Table 1. Questions for which the calculated CVR value was less than the desired amount (according to the number of experts evaluating the question) were excluded from the test because they did not have acceptable content validity based on the content validity index.

**Table 1: Lavoshe for coefficient decision, Content validity CVR**

| Minimum of validity | Number of experts | Minimum of validity | Number of experts |
|---|---|---|---|
| 0.56 | 12 | 0.99 | 5 |
| 0.54 | 13 | 0.99 | 6 |
| 0.54 | 14 | 0.99 | 7 |
| 0.49 | 15 | 0.78 | 8 |
| 0.42 | 20 | 0.75 | 9 |
| 0.37 | 25 | 0.62 | 10 |
| 0.33 | 30 | 0.89 | 11 |

## 4. Content validity index

Content validity according to Table 2 is acceptable for 8 experts at least 0.78, which in this study for all items are in the range (0.80-0.96), so the relative coefficient of content validity of all items in the range is acceptable and is approved.

**Table 2: Results of relative coefficient and content validity index of the questionnaire**

| CVI | CVR | Barriers |
|---|---|---|
| 0.95 | 0.80 | Factors related to the manufacturer |
| 0.88 | 0.85 | Consumer factors |
| 0.90 | 0.96 | Laboratory factors |
| 0.80 | 0.90 | Factors related to relevant organizations |

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**5. Analysis of interviews**

This study, based on semi-structured interviews and purposeful observations with experts in the quality section, included quality stage information, including views of managers of material production centers, contractors, experts of the provincial engineering system, housing, and urban planning, standard administration, executors, and supervisors of construction projects. Data analysis in this stage was done based on coding (open and axial coding). After analyzing the similarities and differences, in the axial coding stage about the obstacles and problems affecting the standardization of production materials in the construction industry, there are four categories production, consumer, laboratory, certified partner, and related organizations, and 20 concepts were extracted.

**6. Analysis of the qualitative stage**

The results of the qualitative section showed that even though at first glance it seems that the problems related to low quality and non-standard materials in construction are mainly related to the manufacturers. But several factors contribute to the use of durable and efficient building materials are involved and producers are only part of this chain; According to the results, these barriers can be divided into four categories: barriers and problems related to the manufacturer, barriers and problems related to the consumer, barriers and problems related to the partner laboratory, and finally barriers related to the relevant organizations. In the axial coding in this section, it was concluded that the problems related to the manufacturer are manufacturing technology, manpower, production control, and culture in production; Problems related to the consumer are consumer knowledge and awareness, and cultural problems in this group. Moreover, the problems related to the laboratory are related to the lack of coordination and adequate supervision between the technical director and the laboratory examiners, who are authorized to record and confirm the test results. And the problems related to the relevant organizations are related to the supervision and coordination between organizations. According to the ranking that was done among the factors affecting standardization, the most important factors are related to the producer with an average of 4.40, the partner laboratory with an average of 4.10, the relevant organizations with an average of 3.90, and finally the factors. It is related to the consumer with an average (3.87).

Suggestions for future research: 1. Using new and standard equipment in production lines, 2. Using the views of experienced and knowledgeable people having experience in production, 3. Creating a culture of standardization by relevant institutions such as radio and television, education, and training, 4. Encouraging producers of high-quality goods and introducing them to people, 5. More supervision and periodic inspection (continuously) in the production process and production methods by relevant organizations, 6. Employing quality control managers in production centers to perform product quality control affairs, 7. Raising the awareness of consumers about their rights for receiving substandard materials, 8. Raising the awareness of consumers and sensitizing them to pay attention to the standard brand when buying construction materials, 9. Using knowledgeable people having experience in laboratories

**7. Conclusion**

Today, we see that except for large construction projects, in urban construction, such as mass or high-rise buildings, the quality of materials is not properly considered and materials are selected and used without sufficient studies and laboratory studies. Therefore, when constructing buildings that consume large amounts of material and are economically significant, it is advisable to measure all the properties specified in the standard for the materials before selecting them and use them if appropriate. Suggestions for future research: 1. Using new and standard equipment in production lines, 2. Using the views of experienced and knowledgeable people with experience in production, 3. Creating a culture of standardization by relevant institutions, including radio and television, education and training, and so on. 4. Encouraging producers with quality goods and introducing them as quality producers among the people.