ACADEMIA International Journal for Social Sciences
Volume 5, Issue 1, 2026 ISSN-L (Online): 3006-6638

Challenges in the Input–Process–Output (IPO) Model Affecting the Quality of Higher Education in AJ&K

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Received: 20-11-2025 **Revised:** 03-12-2025 **Accepted:** 18-12-2025 **Published:** 05-01-2026

ABSTRACT

This paper has discussed issues that plague the quality of higher education in Azar Jammu and Kashmir (AJ&K) through the Input-Process-Output (IPO) model. The research design used was quantitative and descriptive, and the data were gathered using 173 faculty members of higher education institutions (public institutions). A structured Likert scale questionnaire was used to collect the data regarding the research question. Using SPSS descriptive statistics, correlation, and multiple regression analysis were used. It was found that the perceived challenges and opportunities had the highest mean score, then societal impact, teaching-learning practices, and, lastly, human and material resources were rated with a relatively small mean score. The correlation analysis showed that there are positive significant correlations between all IPO dimensions. The findings of multiple regression revealed that the societal impact was predicted by human and material resources, teaching, learning practices, and perceived challenges and opportunities significantly; nevertheless, a combination of these factors predicted societal impact (39.3). The results affirm the fact that interrelated input, process, and contextual variables affect the quality of higher education in AJ&K. The paper finds that IPO-based approaches that are holistic in nature, emphasize on resource advancements, pedagogical and strategic management of issues are critical in enhancing the quality of higher education and societal performance in the region.

Keywords: *Input–Process–Output (IPO) model, higher education quality, teaching–learning practices, human and material resources, societal impact, Azad Jammu and Kashmir (AJ&K)*

INTRODUCTION

It is a well-known fact that education serves as a key contributor to human and national growth because it provides people with knowledge, skills, values, and critical thinking skills to meet the demands of social and economic changes (Pakistan Institute of Education [PIE], 2024). The role of higher education in human

capital development, innovation, and sustainable economic development is especially crucial due to the creation of qualified specialists and creators of knowledge (HEC, 2024).

The importance of quality in higher education has become a global concern of the day with universities being increasingly held accountable in regards to graduate results, research output, and impact to the society (Harvey and Green, 1993; Materu, 2007). Higher education quality is a complex and multifaceted concept that cannot be measured on the basis of one indicator. Researchers argue that it is important to understand quality in a systems perspective that incorporates inputs, processes, and outputs (Owlia & Aspinwall, 1997; Srikanthan and Dalrymple, 2005).

The Input-Process-Output (IPO) model offers an in-depth model of assessment of the quality of higher education by analyzing how institutional resources (inputs) are converted into measurable education output (outputs) using teaching, learning, assessment, and governance processes (processes) (Kettunen, 2011; Miller, 2015). The inputs are the quality of the faculty, infrastructure, funding, curriculum and the preparedness of the student and the processes are pedagogical practices, curriculum delivery, assessment systems and academic governance. Outputs indicate competencies, employability, research productivity, and contribution to societies of graduates (Beerkens, 2013; Harvey and Green, 2012).

Within the framework of Azad Jammu and Kashmir (AJ&K) the system of higher education is still experiencing different types of challenges that hamper on the quality of education. These are poor infrastructure, insufficient investments, lack of competent faculty, obsolete curricula, inefficient evaluation systems, and lack of research potential (Zia, 2023). Unequal access and quality of learning are even further aggravated by discrepancies between urban and rural institutions leading to graduates who tend to be uncompetent in the labor market (Dawn, 2023).

Although the recent policy efforts are focused on educational reform, there is a lack of empirical research that utilizes an all-inclusive IPO-based strategy to investigate the quality of higher education in AJ&K (PIE, 2024; Dawn, 2024). Evidence based policy decisions and institutional reform therefore require a system analysis of challenges related to inputs, process and outcomes. In line with this, the present study will use the Input-Process-Output (IPO) model to explore the critical issues that influence the quality of higher education in AJ&K with respect to institutional performance and graduate performance.

Statement of the Problem

Given that higher education institutions in Azar Jammu and Kashmir (AJ&K) have been growing over time, the quality of higher education is a major issue. The lack of essential institutional inputs such as availability of faculty, infrastructure, funding and preparedness of the students still erode the quality of education. Moreover, the academic and administrative systems are weak in terms of their teaching and learning practices, curriculum delivery, and assessment systems, and governance structures, which restrict transfer of knowledge and growth of skills. Consequently, the outputs of higher education especially the graduate competencies, employability, and research productivity are still below the expected levels. Even though there are some national level researches on the quality of higher education in Pakistan, no region-specific quantitative research has attempted to systematically analyze these issues through an integrated framework. The lack of an empirical analysis based on the Input Process and the Output (IPO) limits the knowledge on the effects of inputs and processes on the joint actions on the educational outputs in AJ&K. Hence, in this paper, IIP model is taken to conduct quantitative analysis of the input-, process-, and output-related issues that influence quality of higher education in AJ&K.

Research Objectives

1. To examine input-related challenges (e.g., faculty, infrastructure, funding, student preparedness) affecting the quality of higher education in AJ&K.

2. To analyze process-related challenges (e.g., teaching–learning practices, curriculum delivery, assessment mechanisms, governance) in higher education institutions of AJ&K.

3. To investigate output-related challenges (e.g., graduate competencies, employability, research productivity) associated with higher education quality in AJ&K.

Research Questions

1. What input-related challenges hinder the quality of higher education in AJ&K?

2. What process-related challenges affect teaching, learning, and academic governance in higher education institutions of AJ&K?

3. What output-related challenges influence graduate outcomes and institutional performance in AJ&K?

LITERATURE REVIEW

Quality of Higher Education: A Systems Perspective

Quality in higher education is a multi-dimensional and contextual construct that does not merely limit itself to academic excellence because it is relevant, efficient, accountable, and outcome (Harvey and Green, 1993). Modern researchers stress the importance of studying the quality of higher education in terms of integrating the institutional factors of input, internal mechanisms, and quantifiable outputs (Owlia and Aspinwall, 1997; Srikanthan and Dalrymple, 2005). This view is parallel with the growing expectations of accountability, employability and social contribution of universities.

Input Process Outlier (IPO) model has become a rather common model of quality analysis to assess the quality of education, especially in tertiary education (Kettunen, 2011; Miller, 2015). It is assumed that the model is characterized by the interactions of institutional resources, academic processes, and governance mechanisms so that the educational outcomes are the outcome of the interactions.

Input-Related Challenges in Higher Education

The inputs denote the resources and conditions that get into the system of education such as the quality of faculty, infrastructure, financial support, curriculum structure, and student readiness (Beerkens, 2013). Through empirical studies, it is always reported that insufficient funding, lack of qualified faculty, minimal chances of professional development, and lack of adequate infrastructure adversely impact quality of higher education, especially in developing regions (Materu, 2007; Zia, 2023).

In Pakistan, there are unbalanced resource distribution, congested classes, inadequate research opportunities, and urban-rural differences in institutions of higher education (HEC, 2024). It is proposed that ineffective teaching, research productivity and student learning outcomes are limited by weak academic inputs (Raza et al., 2023). These issues are further complicated in geographically remotely located areas

like AJ&K due to institutional capacity as well as geographic isolation, which makes these areas to be empirically investigated on a region-specific level.

Process-Related Challenges in Higher Education

Processes are the systems of transformation that take the input to produce educational outputs. These comprise teaching/learning activities, system of curriculum delivery, assessment, system of academic leadership and structure of governance (Srikanthan and Dalrymple, 2005). The studies have shown that poor quality of education is contributed by ineffective pedagogical practices, obsolete learning curricula, and assessment practices and poor governance (Harvey and Green, 2012).

According to several studies in the developing world, institutions of higher learning still depend on rote-learning, lack of student participation, and the traditional system of examination, which do not enhance critical thinking and problem-solving skills (Owlia & Aspinwall, 1997; Kettunen, 2011). Lack of governance efficiency, faculty lack autonomy and poor quality assurance systems further undermine academic processes in Pakistan (HEC, 2024). These deficits at the process level directly influence learning activity and readiness of graduates.

Output-Related Challenges in Higher Education

Outputs mean measurable deliverables of higher education such as graduate competencies, employability, research production, and contribution to society (Beerkens, 2013). Graduate employability is now a central measure of the quality of higher education because the labor market is shifting towards the need to have transferable skills, innovation and flexibility (Harvey and Green, 2012).

In Pakistan, empirical studies show that there is an incongruence between the skills of graduate university graduates and the needs of the labor market, which is a cause of graduate unemployment and underemployment (Zia, 2023). Poor productivity of research and absence of effective university-industry connections also limit performance of institutions. These problems associated with the output are cumulative weaknesses in inputs and processes, which underline the applicability of the IPO model to systematic analysis.

Research Gap

Despite the evidence of studies conducted at national level investigating the quality challenges in the higher education sector in Pakistan, there is a lack of empirical research followed by adopting an integrated IPO-based framework, especially in Azar Jammu and Kashmir. The current research usually focuses on individual factors instead of the collective effect of inputs, processes, and outputs on the quality of education. This knowledge gap indicates that a quantitative, systems-based study is necessary to produce context-specific evidence that may be used to formulate policy decisions and institutional quality improvement initiatives in AJ&K.

METHODOLOGY

Nature of the Study

The research was a descriptive and quantitative study with an objective of analyzing issues that were compromising the quality of higher education in Azar Jammu and Kashmir (AJ&K) as an input to the process via an Input-Process-Output (IPO) framework. The paper was concerned with gathering empirical

evidence among teachers in higher education institutions, since they are directly affected in terms of the processes of academic delivery, institutions, and quality assurance.

Research Design

The cross-sectional quantitative research design provided the opportunity to consider the input-, process-, and output-related issues impacting the quality of higher education in AJ&K by using the data obtained on the level of higher education teachers and obtaining a quantifiable insight into the available institutional resources, academic practices, and educational outcomes so that the findings could be statistically analyzed and interpreted without bias.

Sample and Sampling Technique

The participants were sampled using a convenience method, among the institutions of higher learning in Azad Jammu and Kashmir (AJ&K). The teachers who were readily available and willing to participate in the study were included in the study and enabled them to collect data efficiently in regard to time and logistical considerations. Through this method 165 higher education teachers were sampled in the sampled institutions. Despite the lack of generalization due to the use of convenience sampling, it was suitable in getting pertinent insights on the part of experienced faculty who have direct interaction with teaching and processes involving institutions.

Table 1: Sampling of the Study

Sr.No	Higher education institutions	No. of Teachers
1	University of Kotli Azad Jammu And Kashmir	87
2	Government Post Graduate (Boys) College Kotli Azad Kashmir	35
3	Government Post Graduate (Girls) College Kotli Azad Kashmir	20
4	Major Khursheed Ahmed Boys Degree College tatapani	15
5	Appa Zaib -Un-Nisa Girls Degree College tatapani	08
Total		165

Data Collection Procedure

Data collection was conducted after ethical approval had been sought with regards to the concerned institutions. The respondents were also told the objectives of the study, the voluntary nature of the study, and the confidentiality of the answers. Questionnaires were administered digitally and in hard copy in order to achieve high numbers of responses. The required participation was guaranteed by the issue of follow-up reminders (Bell, 2014; Dillman et al., 2014).

Ethical Considerations

Prior to collection of data, ethical approval was received in institutions that were concerned. The study objectives were explained to the participants as well as the voluntary nature of the participation and confidentiality of answers. The questionnaires were given out in print and online to enable respondents to have the best response rates. There were follow-up reminders to facilitate sufficient attendance (Bell, 2014; Dillman et al., 2014).

Table 2: Mean Scores of Major Dimensions Influencing the Quality of Higher Education in AJ&K

Dimensions	**N**	**Mean**
Human Material resource's	173	2.8139
Teaching Learning Practices	173	2.9896
Societal Impact	173	3.0931
Perceived Challenges and Opportunities	173	3.3584

Table 3: Correlation Matrix Among Dimensions of the Input–Process–Output (IPO) Model

Variables	**1**	**2**	**3**	**4**
1. Human and Material Resources	1	.561**	.574**	.361**
2. Teaching–Learning Practices	.561**	1	.483**	.199**
3. Societal Impact	.574**	.483**	1	.355**
4. Perceived Challenges and Opportunities	.361**	.199**	.355**	1

Note. $N = 173$. **p** < .01 (two-tailed).

Table 4: **Multiple Regression Analysis Predicting Societal Impact**

Predictor Variables	**B**	**SE B**	**β**	**t**	**p**
Constant	0.935	0.239	—	3.909	< .001
Human and Material Resources	0.325	0.065	0.380	4.988	< .001
Teaching–Learning Practices	0.238	0.073	0.236	3.258	.001
Perceived Challenges and Opportunities	0.158	0.059	0.171	2.664	.008

Note. Dependent variable: *Societal Impact*. *N* = 173. All predictors entered simultaneously.

RESULTS

According to the descriptive analysis (Table 2), the highest mean score (M = 3.3584) was given to the Perceived Challenges and Opportunities dimension showing that the respondents were the most aware of the issues in institutional challenges and possible ways of improvement in AJ&K higher education. The other important contributors to quality included Societal Impact (M = 3.0931) and Teaching Learning Practices (M = 2.9896) but the human and material resources (M = 2.8139) had the least score, which indicates that the resource constraints are a major problem, though the respondents find it to have little impact as compared to the process and opportunity related factors.

The correlation analysis (Table 3) showed that there were large positive relationships between all the dimensions of the Input Process output model (IPO). There was a strong correlation between Human and Material Resources and Teaching-Learning Practices (r =. 561, p <.01) and Societal Impact (r =.574, p <.01), showing that optimistic institutional investments are linked to a higher quality of teaching and greater societal outcomes. It was found out that there were moderate positive correlations between Perceived Challenges and Opportunities and Human and Material Resources (r =.361, p <.01) and Societal Impact (r =.355, p <.01).

A multiple regression analysis (Table 4) indicated that the Human and Material Resources (B = 0.325, p <.001), Teaching Learning Practices (B = 0.238, p =.001) and Perceived Challenges and Opportunities (B = 0.158, p =. 008) had significant predictive value of Societal Impact with the model showing high percentage of the variance (R 2 = 0.393). These findings affirm that institutional inputs, effective teaching practices, and strategic response to opportunities are combined in improving the contribution of higher education to the society in AJ&K.

FINDINGS

1. Perceived Challenges and Opportunities was found to be the most powerful variable influencing the quality of higher education by the respondents, which implies that awareness and strategic management of challenges facing institutions is important to respond to them.

2. Societal Impact was positively and significantly related to Human and Material Resources and Teaching Learning Practices, showing that the quality of faculty, infrastructure and effective pedagogy has a direct impact on outcomes at the institution.

3. The outcomes of the regression revealed that each of the three dimensions, resources, teaching practices and opportunities, makes an independent and significant contribution to the societal impact and as a group they explain 39.3% of the variation. This shows the significance of quality improvement considering a holistic approach and not specific aspects.

DISCUSSION

The research establishes that interdependent dimensions of IPO model can determine the quality of higher education in AJ &K. The large mean of Perceived Challenges and Opportunities compares to the prior studies where faculty views of institutional obstacles and possible solutions to those obstacles influence the success of education (Altbach et al., 2019; Resnik, 2018). The results of the correlation indicate that processes (teaching learning practices) and outputs (societal impact) are strongly supported by the inputs (human and material resources), which are supported by the findings of the global evidence that infrastructures, quality of the faculty, and the effectiveness of teaching are necessary to achieve positive student and societal outcomes (Cohen et al., 2018).

The findings of regression support the idea that betterment of the institutional resources, betterment of the pedagogical practices, and the strategic utilization of opportunities are all needed in order to maximize the contribution made by higher education to society. These findings indicate that interventions that only focus on one dimension (i.e. resources, but not pedagogical reform) may have a little effect. Therefore, a comprehensive plan based on the IPO model is the key to the successful implementation of sustainable change in AJ&K higher education.

CONCLUSION

This paper has shown that the Input-Process-Output (IPO) model is a good tool of analyzing and improving the quality of higher education in AJ&K, Human and Material Resources, Teaching-Learning Practices, and Perceived Challenges and Opportunities are all influential factors in explaining Societal Impact with a combined variance of 39.3%. The results point to the fact that the quality of higher education is multi-dimensional, and investment in institutional inputs, improving pedagogical practices, and prudent use of challenges and opportunities are all necessary at the same time. These findings can be used by policymakers and administrators to develop data- oriented and integrated interventions that enhance teaching and student performance as well as contributions to society. The paper underlines the need to have systemic, holistic strategies to sustainable development of higher education in AJ&K.

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