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TERRITORIAL CHARACTERISTICS OF AGRICULTURAL PRODUCTION IN MOUNTAIN AND FOOTHILL AREAS

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Abstract: Organizing agricultural production in mountain and foothill areas requires consideration of spatial differences in natural conditions, resource use, and market linkages. Applying production solutions developed for plains without examining local conditions may widen the gap between costs and expected outcomes. This article aims to systematize the characteristics of agricultural production in these areas and clarify their economic implications. The study is a theoretical and analytical review of selected publicly available sources, employing systems analysis, comparative economic interpretation, and logical synthesis. The analysis outlines how terrain, the spatial dispersion of land parcels, water supply, transport, and storage conditions influence technology choices, the timing of agricultural operations, and marketing opportunities. A central conclusion is that resource availability should not be equated with the ability to use resources economically, nor should selling prices be equated with a farm's final financial performance. The article's scholarly contribution lies in synthesizing existing perspectives through the relationships between territorial characteristics, production decisions, and potential economic consequences. Its practical relevance lies in aligning recommendations on specialization, services, and infrastructure with local demand and costs. The conclusions are not presented as newly established empirical regularities; their applicability to Uzbekistan requires examination through further territorial studies.

Keywords: mountain and foothill areas; agricultural production; territorial characteristics; land and water resources; production costs; market access; systems analysis.

1. Introduction

The territorial characteristics of agricultural production are reflected in the spatial distribution of land and water resources, natural conditions, and economic linkages. In mountain and foothill areas, variations in terrain, microclimate, and the distribution of usable land require production decisions to be adapted to local conditions. Therefore, before transferring a technology or farm management practice that is effective in one location to another, its costs and feasibility must be assessed.

FAO characterizes mountain farming by land parcels situated at different elevations, diverse climatic conditions, and constraints on mechanization. It also identifies access to roads and markets as an important issue [4]. The publication edited by R. Romeo and colleagues links the development of locally adapted agroecological practices to services, infrastructure, and support for small farms [1].

Research on this topic addresses several dimensions. P. Gauli and co-authors reviewed the literature on mountain agriculture in Nepal, highlighting small landholdings, labour migration, and soil fertility problems [2]. K. Kafle, T. Songsermsawas, and P. Winters empirically examined the effects of a market linkage development project on farm incomes in Western Nepal [3]. The former study contributes to understanding resource conditions and livelihoods, while the latter examines opportunities for marketing agricultural products. Their findings do not constitute directly validated evidence for regions of Uzbekistan.

The research question addressed in this article is as follows: which producer decisions are influenced by territorial characteristics, and what economic consequences may arise

from this influence? This question allows the analysis to move beyond listing natural features towards explaining their implications for farm operations.

The study aims to systematize the territorial characteristics of agricultural production in mountain and foothill areas and interpret their economic implications. Its objectives are to examine the influence of natural conditions on technology choices and specialization, analyse the conditions governing land and water use, clarify the importance of market linkages, and formulate recommendations suited to local conditions.

The article's scholarly contribution lies in organizing existing perspectives around the relationship between territorial characteristics, production decisions, and economic consequences. This does not imply the development of a new assessment method or the identification of a statistical regularity. The following sections present the methodology, analytical findings, discussion, and conclusions.

2. Methodology

The study is a theoretical and analytical review of selected sources. It focuses on agricultural production in mountain and foothill areas, examining how territorial conditions influence resource use, production, and marketing decisions. No uniform numerical elevation threshold was applied, as the article does not aim to map areas or classify administrative districts. The term "foothill" is not treated as fully equivalent to the concept of "hill" used in international sources.

The source base comprises five openly accessible publications and online resources: an FAO book on mountain farming, two FAO thematic webpages, a scholarly review concerning Nepal, and an IFAD empirical study [1-5]. Sources were selected based on their direct relevance to the topic, clearly identifiable authorship or institutional origin, and accessibility for verification. This selection is not presented as a systematic review covering the entire scholarly literature.

The analysis proceeded in three stages. First, observations concerning territorial conditions and farm operations were identified in the sources. These were then grouped under land and water use, technology choices, the organization of agricultural operations, and product marketing. Finally, findings reported in the sources were distinguished from the author's economic interpretations, and the conditions under which the recommendations could be applied were specified.

Systems analysis was used to explain the relationship between natural conditions and farm operations. Comparative economic interpretation accounted for differences in local conditions, while logical synthesis organized the potential economic consequences of territorial characteristics. Neither formal legal nor comparative legal methods were employed, since regulatory documents were not a separate object of analysis.

The author conducted no field observations, questionnaire surveys, or econometric assessments. Empirical findings from studies conducted abroad are presented with references to their sources, while the article's own conclusions constitute theoretical generalizations. The study follows the principles of grounding claims in sources, distinguishing economic concepts, and explicitly stating the limits of generalization.

3. Results

The first general conclusion of the analysis is that the quantity of resources does not fully describe production conditions. Farms with the same land area may differ in slope, field accessibility, and the spatial distribution of their plots. In the author's interpretation, these differences affect the costs of moving machinery, carrying out agricultural operations, and organizing labour.

In areas with complex terrain, technology choices should not be based solely on productivity. The suitability of machinery for local conditions, the availability of maintenance services, and the extent of its use throughout the season are also important.

For some farms, using machinery services may be more appropriate than purchasing expensive equipment. Comparing local costs determines which option is economically preferable.

Microclimatic differences are important when selecting crops and scheduling agricultural operations. However, suitability for natural conditions is not a sufficient condition for profitability. Even where a particular product can be grown, the conditions for delivering it at the quality and time required by buyers must be assessed. This requirement also applies to foothill areas; it is not reasonable to assume that all parts of these areas have equal access to water or transport.

Small farm size and the spatial dispersion of land parcels are distinct characteristics. A small scale of operation may limit the scope for using services, while dispersed plots complicate movement between fields and the coordination of agricultural operations. Consequently, farm size alone cannot adequately explain all organizational costs.

Joint purchasing, shared use of machinery services, and collective transport of products are practical forms of cooperation among farms. Their economic benefits depend on the distances between participants, the timing of service needs, and the allocation of costs. Savings from cooperation must be compared with the costs of organizing it.

The existence of a water source does not necessarily mean that water can be accessed when needed. The seasonal distribution of water, delivery conditions, and the likelihood of interruptions are important for crop selection and production planning. Where water supply is unreliable, the balance between requirements and available supply should be examined before production is expanded. In this article, this relationship is interpreted theoretically, and its quantitative effect has not been estimated.

The ability to produce a product differs from the ability to sell it. FAO emphasizes the need to improve production, processing, and marketing stages of the value chain together [5]. This article interprets that position as a requirement to assess buyers, delivery arrangements, and storage conditions before recommending an expansion of production.

Distance to a market is only one aspect of transport conditions. Road quality, transport availability, shipment volumes, and time costs also matter. For perishable products, delays may reduce the quantity suitable for sale. Storage services provide greater flexibility in choosing when to sell, but service charges and product losses must be considered.

The IFAD study shows that improved market linkages among farms in Western Nepal were associated with increased income, driven by larger sales volumes at lower prices [3]. This finding suggests that a high price alone is not a sufficient indicator of favourable economic performance. Assessing net profit requires consideration of production and marketing costs as well as revenue.

Table 1. Territorial conditions, production decisions, and potential economic consequences

Territorial condition	Related decision	Potential economic consequence
Complex terrain	Choice of machinery or services	Differences in labour and service costs
Microclimatic differences	Selection of crops and timing of operations	Changes in product mix and marketing periods
Dispersed land parcels	Coordination of field operations	Travel and organizational costs
Water supply interruptions	Determination of crop mix and production scale	Additional costs and uncertainty over yields
Transport constraints	Organization of deliveries	Transport costs and risk of product losses
Storage availability	Choice of selling time	Opportunities to obtain a more favourable price, alongside storage costs

Source: The author's theoretical synthesis based on [1-5]. The table does not constitute a statistical assessment or a set of regularities validated for all areas.

The conclusion arising from this synthesis is that the consequences of territorial conditions depend on local services and market linkages. Therefore, alongside natural differences, it is necessary to examine farm operating conditions that may reduce or amplify their effects.

4. Discussion

The sources reviewed indicate that natural conditions, farm resources, and market linkages represent complementary dimensions of analysis. Romeo and co-editors address locally adapted sustainable practices [1], Gauli and co-authors examine resource and livelihood challenges [2], and Kafle and co-authors investigate the outcomes of improved market linkages [3]. This article synthesizes these perspectives by examining the economic conditions underlying production decisions.

FAO's perspective on the adaptation of family farms to local conditions [4] does not imply that small farms have an economic advantage in every situation. Adaptability must be assessed alongside service costs, product shipment volumes, and marketing opportunities. Likewise, cooperation becomes a justified recommendation only when organizational costs and the alignment of participants' interests are taken into account.

The IFAD findings on improved market linkages [3] demonstrate the limitations of assessing producers' economic interests solely through selling prices. However, the positive outcomes of this particular project cannot be generalized to all mountain areas. Product type, local demand, competition among buyers, and delivery costs determine the conditions under which the recommendation is applicable.

The article's practical contribution lies in identifying the specific nature of a constraint when selecting priority measures. Where machinery use is difficult, suitable services should be assessed; where product marketing is constrained, buyer relationships and delivery arrangements should be examined; and where storage facilities are proposed, expected utilization and cost recovery should be evaluated. Each recommendation should address the relevant problem.

The main limitations of the study are the small number of sources, reliance on international experience, and the absence of local empirical validation. Generalizations concerning foothill areas are more limited than the evidence relating to mountain areas.

No elevation-based classification or quantitative comparison across areas was undertaken. Consequently, the findings are insufficient for ranking areas or justifying an investment decision for a specific district.

5. Conclusion

Agricultural production in mountain and foothill areas should be examined by interpreting natural conditions through their effects on farm decisions. This article provides a theoretical synthesis of the conditions governing land and water use, technology choices, and product marketing.

The first conclusion is that resource availability is not equivalent to ease of use or economic viability. The location of land, the timing of water availability, and the conditions for carrying out agricultural operations should be considered in production planning.

The second conclusion is that specialization should be aligned with suitability for natural conditions, buyer demand, and marketing costs. The ability to produce a particular product does not automatically ensure that it can be sold profitably.

The third conclusion is that recommendations concerning cooperation among farms and infrastructure projects are conditional. Their suitability should be assessed on the basis of demand for services, expected utilization, organizational costs, and anticipated savings.

Future research should collect comparable data from mountain and foothill farms and examine differences in the costs of field operations, water supply, transport, and marketing. This would enable the theoretical relationships proposed here to be tested under local conditions and provide a basis for more specific recommendations.

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