

Original Article

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An analysis of the impact of construction cost and land price on the economic development of Iran using PCA

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Abstract

This research aims to examine the impact of construction costs and land prices on economic development in Iran during the period from 1380 to 1400 M. This research falls within the field of macroeconomics. It employs variables such as economic growth rate, Gini coefficient, unemployment rate, Legatum Prosperity Index, and Human Development Index to construct an Economic Development Index using PCA; additionally, for construction cost, the average building cost estimate is used, and for land price, the land price index is utilized. The estimation model of this research is ARDL, and for analysis, data were also analyzed using descriptive statistics, ADF stationarity tests, classical assumptions, CUSUM structural break tests, the Bound Test, and the ECM error correction model. The findings of this study showed that the cost of construction and land price had a negative and significant relationship with the economic development of Iran during the period under consideration. It is worth noting that the limitation of this study lies in its data, as only data from urban areas of Iran were used, and statistics for rural areas were not available.

Keywords

construction cost
construction industry
economic development
Iranian economy
land price
PCA method

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1. Introduction

Economic development is a macro objective that all societies and countries have focused their efforts on achieving and then improving. The construction industry is also linked to a large share of jobs and the social fabric, and it accounts for a significant portion of the country's economic flow. Since construction costs and land prices in the construction industry are significant and play a decisive role, and also affect the final price of buildings, it is worth examining and researching how these two factors influence the country's economic development.

Since economic development is a qualitative concept and cannot be quantitatively measured or compared, it is necessary to introduce and evaluate it through its representative quantitative variables. Given that economic development is a multidimensional concept and various variables contribute to explaining it, it is necessary to discuss how to integrate the representative variables of economic development so that, based on statistical analysis methods and econometric tests, the impact of construction cost indices and the land price index on economic development can be examined. The resulting findings can be analyzed and interpreted.

On the other hand, since the population of Iran has a relatively young structure. The younger generation—driven by the need for independence, employment, and the formation of shared or even independent households—needs jobs and buildings, especially housing. Demand for construction, particularly for housing, has been very high in recent years, whether for starting a business or for establishing a shared or even independent life.

It appears that the existing problems in the construction industry will affect the flow of economics, jobs, living standards, small and large industries, and the social and welfare situation of the people. In short, one can say that the presence of problems in the construction industry has led to numerous issues on both a micro and macroeconomic level, and the emergence of economic problems will, in turn, bring about social crises.

To set the construction industry in motion, the most fundamental driver—and, of course, the most fundamental problem—is the cost of construction and land acquisition. Given that the construction industry is closely tied to economic and social issues and seeks to meet the basic needs of humans and, in a sense, citizens, examining the impact of the construction industry on the country's economic development by

focusing on the cost index of construction and the land price index is of great importance and necessity.

This research seeks to clarify how the cost of construction and land prices have quantitatively impacted economic development in Iran from 1380 to 1400.

In this study, for the first time, the simultaneous impact of two key variables in the construction sector—the cost of construction and land price—on Iran's economic development over the period 1380 to 1400 is examined. In contrast, most previous studies have focused on only one of these factors. Moreover, this study adopts a multidimensional perspective on economic development and, instead of using individual indicators, constructs a composite index of five representative variables—economic growth rate, Gini coefficient, unemployment rate, Legatum Prosperity Index, and Human Development Index—using Principal Component Analysis. This innovative approach has transformed the measurement of economic development from a one-dimensional state to a comprehensive, data-driven one. These aspects are considered the distinguishing and innovative features of this research compared to previous studies. In the continuation of the research, the second section outlines the subject literature and research background. The third section addresses the research methodology, and the fourth section analyzes the results. The research findings are reported in the fifth section. The discussion, conclusion, and suggestions are described in the final section.

2. Subject literature and research background

2.1. Economic growth, its distinction, and its relationship with economic development

Although an increase in Gross National Product can mask the inadequacies of internal signs of economic progress, it may also exacerbate inequality because such progress only includes a small group. Therefore, economic analysts have concluded that development should not be equated with economic growth, which, based on the “capital accumulation” model, leads to “capitalization of growth” limited. Accordingly, economic analysts have concluded that development should not be restricted to economic growth, which itself, based on the “capital accumulation” model, is interpreted as “investment in growth capital.” Economic growth, by contrast, means producing more output. In contrast, economic development implies both increased output and a transformation in the methods of production, as well as in the allocation of

resources and labor across various sectors of production. (Kindleberger, 1972)

The differences between economic growth and economic development can be summarized as follows:

- 1) Economic growth may be a purely quantitative transformation, and it usually focuses on variables such as Gross Domestic Product. Economic growth focuses on quantitative variables such as GDP, investment, and exports, which can be calculated and measured in monetary terms, but development, in addition to quantitative variables, also encompasses qualitative variables such as reducing unemployment, illiteracy, deprivation, poverty, and the like.
- 2) The concept of growth is limited, whereas development is broader. The result is that every form of development is growth, but not every growth is accompanied by development.
- 3) Growth may occur in the short term and in leaps, but development usually takes time and happens slowly and gradually.
- 4) Growth is reversible and can swing from positive to

negative, but development is such that it cannot be reversed. If people gain insight and knowledge or reach a certain level of development, you cannot take away their development; at most, you can stop their progress.

- 5) Development is a relative concept, but absolute growth can be. In other words, growth continues even after development.
- 6) The topic of economic growth is more relevant to developed countries, while economic development is more relevant to developing countries.
- 7) Growth is a tool, and economic development is the goal; if the opposite is observed, society lags.
- 8) Economic growth deals only with tradable variables, that is, those that can be exchanged, but in development, non-tradable goods and variables also play an important role.
- 9) Government has no impact on economic growth, whether it is autocratic or democratic, but from the perspective of development, equity, transparency, participation, democracy, and freedom are important.

Table 1. A comparison between economic growth and economic development (source: Saeedi, 2007 & Yousefi, 2009)

Economic growth	Economic development
It is a quantitative transformation and focuses more on measurable monetary variables such as GDP, investment, and exports.	In addition to quantitative indicators, it also includes qualitative dimensions such as reducing poverty, unemployment, illiteracy, and deprivation.
It has a narrower and more specific concept.	It has a broader, more comprehensive concept that also includes social, cultural, human, and other dimensions.
It may occur in the short term and in a sudden manner.	It is usually a long-term, gradual, and continuous process.
It is reversible and may change from positive to negative.	It is permanent and irreversible; once achieved, it does not disappear.
It is absolute; that is, its amount is expressed numerically.	It depends on comparing people's living conditions and quality of life.
It is more commonly discussed in developed countries.	It is mainly related to developing countries.
It is the means and tool for achieving development.	The ultimate goal of the process is economic and social.
Focuses on tradable goods and variables.	Non-tradable goods and variables such as education, health, and other social institutions are also important.
The role of government or the form of governance does not have a direct impact on it.	It depends on democracy, transparency, accountability, and social participation.

The concepts of economic development and economic growth are significantly different, but in some cases, they are used interchangeably. For policymakers and decision-makers to develop, it is essential to understand the relationship between the two. Development strategies should be formulated to achieve sustainable, inclusive economic growth and economic development. These two economic concepts

influence each other. However, there is limited clarity regarding the relationship. (Meyer et al., 2017)

Construction costs and their relationship with economic growth

Building materials are one of the fundamental inputs in housing production, and their price changes have a significant impact on the cost of housing construction. Moreover, these materials account for the largest

share of the housing sector's value added. To assess the effect of housing sector development on economic growth, it is necessary to replace imported building materials with domestic ones. An increase in demand for building materials leads to higher construction costs, which in turn affects the price of completed housing units. Another issue related to building materials is the volume of imports and domestic production; this, together with policies on tariffs for imported materials such as cement and iron, ultimately impacts construction costs. (Khalili Iraqi, 1999)

Construction is an integral part of the development and modernization process, and it is closely related to economic growth. This does not mean that offering incentives and increasing project costs necessarily lead to economic growth. In Keynesian terms, as in any other sector, increasing spending in the construction sector stimulates economic growth.

The construction sector is mainly concerned with providing capital infrastructure that impacts economic growth. The provision of such infrastructure creates significant employment opportunities for the population, which, through the multiplier effect, generates further investment in other sectors of the economy. (Dlamini, 2014)

Land price and its relationship with economic growth

Land price has a significant relationship with economic growth. In mature economies such as Canada, France, and the United States, land value ranged from about one-third to three-fourths of gross domestic product in the mid-1980s. It accounted for between 8 and 21 percent of the estimated national wealth. In the rapidly growing economies of Japan and South Korea, land values in the 1980s were three to six times GNP and represented half or more of the estimated national wealth. (Mayo, 1998)

Land financing is rooted in the high price of residential land for sale, which leads to an increase in housing prices and, consequently, economic growth. In fact, land price has a positive and significant relationship with economic growth in such a way that in the cities of the eastern China region, with a 1 percent increase in land price, economic growth increases by 0.074. In the central region of China, economic growth also increases by 0.014 with a 1% increase in land price. Overall, economic growth is significantly influenced by land price, with an impact coefficient of 0.071. (Sun et al., 2022)

2.1. Income distribution and its relationship with economic development

Lucien and Morson (1994) state that changes in the distribution of income (whether self-induced or induced) can, in turn, affect employment. If a reduction in income inequality is both an incentive and a driver of employment growth, it can lead to a reduction in income dispersion. On the other hand, if reducing income inequality leads to higher unemployment, any egalitarian policy (reducing income distribution inequality) will quickly face serious and fundamental problems.

In practice, development theorists do not consider the large income gap between the lower and upper classes in developing countries to be an economic advantage, but instead state that it is an obstacle to economic growth and development. Most development scholars emphasize the positive role of a broad middle class in a society. They express that in most Third World countries, the class structure takes the form of a pyramid with a narrow apex and an extensive base, meaning that a tiny percentage of the population is extremely wealthy, and a large percentage is extremely poor. The middle class is small and of little importance. (Roobahan, 2008)

For economic development, standards are set, such as ensuring that the number of people below the absolute poverty line does not increase and that income distribution does not become excessively unequal. Therefore, one of the issues always raised in relation to economic development is income inequality in society. (Babakhani, 2008)

One of the characteristics of a healthy economy is the equitable distribution of income and its feedback effect on economic development throughout society. Policymakers in various communities, in order to address this issue, strive to reduce inequalities by developing and implementing multiple programs to eliminate deprivation. (Akhavan Fard, 2012)

2.2 Employment and its relationship with economic development

From Schumpeter's perspective (Schumpeter, 2015), the entrepreneurial process is one of the fundamental parameters in the economic development of a country or region. According to Kirzner (1973), in economic development, the entrepreneur, rather than being a passive agent, as in the neoclassical model, reacts to those opportunities and, as a profit seeker, pursues

capturing the profits of opportunities rather than creating opportunities. (Faraji et al., 2015)

Wennekers and Thurik (1999) state in a study that the two important roles of entrepreneurship in economic growth and development are: first, a new path, and second, novelty. First, the basic entrepreneurs are the founders of a new business: the individual who founds a new business and then perhaps organizes and operates it, whether that company acts innovatively or not; secondly, the entrepreneur plays a more general innovative role in economic life: the entrepreneur, in the role of an innovator and as an individual with numerous inventions and economic ideas, is also capable of establishing a company. Therefore, novelty in launch and innovation are the most important factors linking entrepreneurship to economic growth. (Faraji et al., 2015)

Economic development is accompanied by fundamental changes in a country's economy. Some of these changes include: increased wealth and welfare of the community's people, increased employment, an increased share of industry and a decreased share of agriculture in national production, and an increase in the number of urban residents and a decrease in the rural population. (Houshmand & Noghabi, 2015)

Achieving a stable, low unemployment rate is one of the fundamental goals of the economy, as, on the one hand, it reflects the optimal performance of the country's macroeconomic system. On the other hand, due to the close link between unemployment and poverty, deprivation, and vulnerability of low-income deciles, it indicates that the country is moving in the right direction of development. It also explains that historically, economic growth has been industry-oriented in the early stages of development and service-oriented in the later stages. This phenomenon is known as Kaldor's laws of growth and provides the basis for the labor transfer and job-generating employment for the surplus labor force of the traditional sector. In other words, economic growth must be industry-oriented, because if growth is service-oriented, the transfer of surplus labor to the formal sector with its higher wages and productivity does not occur. (Hajamini, 2020)

Ferreiro & Gomez (2019) explain that the growth of the industry-oriented industry is rapid and job-generating for the following reasons:

- 1) Industry spillovers lead to an increase in the efficiency of the entire economy.
- 2) The industry has economies of scale, so product growth leads to increased efficiency;

3) The growth of the industrial sector leads to the expansion of the services sector as a complement to production.

4) In the early stages of development, income elasticity of demand for industrial goods is higher than that for services, and industrial goods are also tradable; as a result, the growth in demand for industrial goods will be faster than the growth in demand for services. For these reasons, relying on structural changes centered on the maturation of the industrial sector can generate more employment.

Entrepreneurship is closely linked to the social and economic development of countries and is now considered one of the indicators of development in emerging economies. Due to the special role and status of entrepreneurs in the process of economic growth and societal progress, many governments in developed and leading countries strive to direct several individuals in society who possess entrepreneurial characteristics to entrepreneurship education and entrepreneurial activities, with the maximum available resources, and by leveraging research findings. (Hajamini, 2020)

Policies that support businesses and encourage investment can help create a favorable business environment that leads to increased entrepreneurship and economic development. (McKenzie, 2023)

Construction costs and their relationship with employment and unemployment

The main drivers of construction cost inflation include material prices and labor costs, which have risen in recent years. In 2017, building materials increased in price by 4.4 percent, and construction workers' wages rose by 2.6 percent. Relatively low unemployment among construction workers (5.3 percent) may help offset the national construction backlog, which reached nine months in 2017, up 4 percent from 2016. A reduction in construction costs could lead to an increase in building activity, which could lead to a decrease in unemployment in the construction industry; this could happen if lower costs make it more profitable for builders to build new projects, leading to increased building activity and increased demand for construction workers. (Turner Center, 2020)

The increase in construction costs can lead to reduced building activity, which in turn can result in higher unemployment in the construction industry. This can occur when higher costs leave developers with lower profits on new projects, slowing construction activity and reducing demand for construction workers.

Construction costs and unemployment are linked, as they both influence each other. Between January 1 and April 1, the national average increase in construction costs in the U.S. was approximately 2.4% (7.5% annualized), while the construction unemployment rate fell slightly from 3.7% during the same period last year to 3.6%. (Kuehner-Hebert, 2022)

The Price of land and its relationship to employment and unemployment

Research by Liu et al. (2013) shows that land price can affect the unemployment rate through the credit and labor channels. A decline in land prices can lead to an increase in the unemployment rate due to the linkage between the housing market and the labor market. During the recession, land prices fell by about 90 percent from their pre-recession peak, and the unemployment rate rose by about 5 percent. These findings indicate that changes in land prices can affect the unemployment rate. The transmission of housing demand shocks to fluctuations in land prices and the unemployment rate operates through both the credit channel and the labor channel. The credit channel, similar to the standard financial multiplier, involves the dynamic interactions between collateral value and the value of a new job match. A 10 percent reduction in land prices leads to a 0.34 percent increase in the unemployment rate. This relationship is observed as the housing and labor markets are integrated in a dynamic general equilibrium model with credit and search frictions. This relationship is attributed to the integration of the housing market and the labor market in a dynamic general equilibrium model with credit frictions and search, which is embedded. It shows that land prices and the unemployment rate move in opposite directions over the business cycle. In fact, they state that two main factors play a role in the relationship between land prices and unemployment:

1. Credit Channel: A decline in land prices could lead to a reduction in collateral value, which could affect the ability of individuals and businesses to access credit. This could, in turn, affect the labor market as businesses struggle to secure funding for expansion or maintenance.

2. Labor channel: The housing market and the labor market are linked through various channels, such as the value of employment adjustment and the marginal utility of consumption. A change in land prices can alter the balance among these channels and lead to fluctuations in the unemployment rate.

The results of the research by Dogan & Topuz (2020) show that changes in residential real estate prices do

not have a direct causal effect on the unemployment rate in the same quarter. However, it takes 9 to 12 months for an increase (decrease) in real estate prices to lead to a decrease (increase) in the unemployment rate. This effect is significant both before and after the financial crisis and is robust and persistent when controlling for the economic characteristics of metropolitan statistical areas. The findings of this study have important implications, as they provide evidence of a snowball effect associated with real estate price shocks, i.e., an increase (decrease) in unemployment rates following a decrease (increase) in real estate prices exacerbates the situation.

2.3. Welfare and its relationship with economic development

Based on Friedman's (1972) perspective, "development" is a constructive process, and innovation can be used to create fundamental changes in the social structure.

Bakhtiari (1992), in his research, has pointed out that from another perspective, development is the process of improving the lives of all people, which has three important aspects:

- 1) Improving the people's standard of living, meaning the income level and consumption of those, the level of medical, educational, and other services, through appropriate processes of economic growth;
- 2) Creating a situation that fosters the "self-esteem" of the people, through the establishment of political, social, and economic structures and institutions that encourage respect for the individual;
- 3) Increasing the freedom of choice by expanding the range of variables of choice (such as increasing the diversity of consumer goods and services).

The outcome of the economic development process is social welfare, and economic development in its comprehensive sense is achieved when poverty and its indicators are eradicated from society.

Economic development plays an important role in raising the quality of life and places the improvement of public welfare among the fundamental objectives. The structure of social welfare is dynamic and subject to transformation, evolving according to the changes that occur in growth, societies, needs, and expectations. In fact, its flexibility and adaptability, along with its biotic characteristics and political considerations, and the indicators of society's economic development, remove its functioning from the reconstruction of and decisions. (Hughju, 2003)

Since the level of welfare depends on consumption,

improving households' consumption levels leads to an improvement in the overall social welfare of the community. Therefore, one of the key objectives of the programs of developing countries is to enhance households' consumption levels. (Mojtahed & Ahmadyan, 2007)

The Human Development Index is one of the indicators that explains economic development in countries and how it occurs. This index, instead of using per capita income, emphasizes broader perspectives on development and serves as a measure of the level of citizens' well-being. (Sharif Khatibi, 2008)

In every society, the existence of social welfare is regarded as one of the most fundamental and important indicators of that society's development. (Ebrahimi, 2015)

Given the significant impacts on human capital and the relationship between economic growth and development and welfare, as well as the influence of these structures on income distribution and, consequently, societal welfare, pure economic or social welfare is no longer the sole focus. The presence of welfare in any society is the necessary and appropriate foundation for sustainable growth and development, the attainment of social justice, and similar goals. (Akbari, 2020)

Construction costs and their relationship to welfare

According to housing experts, the most important indicator of the relationship between people's welfare and housing is the "affordability index" or "accessibility index" to housing, which is defined as the average ratio of housing price to annual household income. (Athari, 2011)

The cost of construction directly impacts the affordability of housing, which is a key component of individual and social welfare. Research has shown that a significant portion of the United States' Gross Domestic Product is spent on housing costs, including the construction of new structures. (Potter, 2016)

Construction costs include various elements such as labor, materials, and legal requirements, all of which can impact the overall well-being of workers and society. For example, rising costs of building materials and labor can lead to higher project costs and potentially affect the creation of affordable and accessible housing. (Terner Center, 2020)

2.4. Human development and its relationship with economic development

The theory of new growth, grounded in the human being, is based on the idea that the most valid

prerequisite for moving toward optimal economic development is investing in the human being, and it insists that development will not be achieved without reducing deprivation and inequality. The Human Development Index has many applications at the national and international levels and is one of the most important indicators of development. The most important application of this index is to identify the economic, social, and cultural contexts that require greater support and attention for policy-making and, ultimately, to provide the necessary measures to improve the country's economic and social situation. The inadequacy of per capita income and economic growth as measures of citizen welfare led some economists to turn their attention to indicators that, in addition to economic variables, also include social and human variables. One of the most important of these indicators is the Human Development Index. In the discussion of human development, the human being is introduced as the origin of development, and modern theories of growth and development are primarily based on the individual. In this sense, investing in the physical and mental dimensions of individuals is considered the most valid condition for moving toward optimal economic development. The primary goal of human development is to serve people and humanity. Cultivating the capabilities of individuals and their capacities, nurturing talents, expanding employment opportunities, increasing income, and improving the quality of human life are among the ultimate objectives of human development. (Maleki, 2003)

Growth in GDP has long been regarded as one of the best indicators of a country's economic growth and development. However, given the limitations of this measure and the fact that GDP is not an adequate gauge of citizens' welfare, economists have shifted their focus to an index that, in addition to economic variables, also includes human and social dimensions. The Human Development Index is one of the best of these indicators. The Human Development Index is actually a kind of proportional table in which the world's countries are evaluated and compared based on parameters such as nutrition, health, life expectancy, education, literacy rates, and real per capita income. (Sharif Khatibi, 2008)

The Human Development Index is one of the sources and charts that explain economic development in countries and how it occurs. This index, rather than using per capita income, emphasizes broader aspects of development, and, apart from being a measure of the level of citizens' welfare, evaluates and assesses

the impact of economic policies on citizens' lives. (Sharif Khatibi, 2008)

Modern theories of economic growth and development cannot reach an appropriate path without the development of human resources. It can be said that there is a powerful, two-way relationship between economic development and human resource development; on one hand, economic growth and development provide the necessary resources to improve human development (public health and well-being, universal and high-quality education, equitable income distribution, and the like). On the other hand, the improvement of human development (high levels of health, sanitation, skills, and the like that increase the productivity of individuals in society) improves economic growth. Human development can be considered one of the strategies for economic growth, and in this, economic growth can also benefit from the effects of human development. If economic growth is not managed correctly, it will be detrimental to economic development. Therefore, the quality of growth, in terms of its impact on poverty reduction and its sustainability, is as important as its quantity. In the growth process, there must be an intermediary through which the benefits of growth are manifested in people's lives. At this point, human development becomes important at the level of the entire economy. (Suri et al., 2011)

According to Amartya Sen, the implementation of human development policy has both direct and indirect effects. Its direct effect, by improving health, life expectancy, and the benefits to people's quality of life, impacts, even if it does not lead to industrial expansion and economic development in the country. Its second effect, then, through increased educational and health opportunities, facilitates industrial growth and economic development, improves efficiency, and all these factors are helpful in their own right in enhancing quality of life. (Dezaji & Ketabforosh Badri, 2014)

The Human Development Index, by including fundamental factors such as health, education, and human capital income—which in some writings are referred to as the “soft” components of the “hardware” of growth—can play a significant role in economic development. (Arabi & Kazemi, 2014)

It is emphasized that for many years, the policy of politicians and managers regarded welfare solely as a social issue. However, given its significant impacts on humanity and the relationship between economic growth and development and welfare, as well as the

influence of these structures on income distribution and, consequently, on societal welfare, pure economic or social welfare is no longer the sole focus today. The presence of welfare in any society leads to self-esteem and peace of mind for the individual, provides the necessary and appropriate foundation for sustainable growth and development, achieves social justice, and so on. (Akbari, 2020)

Construction costs and their relationship with human development

Construction is an important part of the development and modernization process. At the same time, it has a close connection to economic growth; this does not mean that providing incentives and increasing costs in construction projects necessarily leads to economic growth. In Keynesian terms, as with any other sector, increasing expenditures in the construction sector stimulates economic growth. The construction sector primarily deals with providing infrastructure for capital, which impacts economic growth. The provision of such infrastructure creates significant employment opportunities for the population, which, through the multiplier effect, generates further investment in other sectors of the economy. (Dlamini, 2014)

3. Research method

“Principal component analysis” is a technique for decomposing large datasets containing a large number of dimensions/features in each observation, increasing the interpretability of the data while preserving as much information as possible and also enabling the visualization of multidimensional data. Formally, PCA (principal component analysis) is a statistical technique for reducing the dimensions of a dataset. This is done by linearly transforming the data into a new coordinate system in which (most of) the variation in the data can be described with fewer dimensions than in the original data. PCA decomposition is applied in many fields such as population genetics, microbiome studies, and atmospheric sciences. (Jolliffe & Cadima, 2016)

It can be shown that the principal components of the eigenvectors are the same as the covariance matrix of the data. Most of the time, the principal components are computed by performing a principal component analysis on the data covariance matrix or by singular value decomposition of the data matrix. The simplest real multivariate analysis based on eigenvectors can be considered the PCA method, which is closely related to parametric and factor analyses. Typically, factor analyses impose specific parametric

assumptions about the underlying structure and solve for the eigenvectors of a distinct quantitative matrix. PCA is related to the CCA (Canonical Correlation Analysis) method, which involves canonical correlation analysis. PCA defines a novel orthogonal coordinate system that optimally describes the variance in a single data set. In contrast, CCA defines a system of coordinate systems that optimally describes the cross-covariance between two data sets. (Barnett & Preisendorfer, 1987; Hsu et al., 2012; Markopoulos et al., 2017, and Chachlakis et al., 2019).

PCA can be defined as the fitting of a p-dimensional ellipse to the data, where each axis of the ellipse represents a principal component. If some of the ellipse axes are small, the variance along that axis is also slight. To find the ellipse axes, you must first center each of the dataset variables by subtracting the mean of the observed values for that variable from each of its values. These mean-transformed values are used in place of the original observed values for each variable; then the data covariance matrix must be calculated, and its eigenvalues and eigenvectors computed. Next, each orthogonal eigenvector must be normalized so that the vectors become unit vectors. After performing this, each of the orthogonal unit eigenvectors can be interpreted as an axis of the fitted ellipse. This basis change transforms the covariance matrix into a diagonal form, where the diagonal elements represent the variance of each axis. The proportion of variance represented by each eigenvector can be calculated by dividing the eigenvalue associated with that eigenvector by the sum of all eigenvalues. Bivariate plots and scatter plots (degree of variance explained) are used to illustrate the PCA findings.

PCA, from one perspective, is an orthogonal linear transformation that converts data into a new coordinate system, so that the most significant variance is captured by some of the predicted scalar projections of the data onto the first coordinates (known as the first principal component), the second largest variance in the second coordinates, and so on. Dimensionality reduction generally leads to information loss. PCA-based dimensionality reduction tends to minimize information loss under a specific signal-and-noise model.

Principal component analysis creates variables that are a linear combination of the original variables. The new variables have the property that they are all orthogonal. The PCA transformation can be useful as a preprocessing step before clustering. PCA is a variance-

focused approach that seeks to reproduce the total variance of the variables, where the components reflect the shared and unique variance of the individual variables. PCA is generally preferred for data reduction purposes (i.e., transforming the variable space into an optimal factor space), but not when the goal is to identify hidden structure or factors.

Factor analysis is similar to principal component analysis, since factor analysis also involves the linear combination of variables. A variation of PCA and factor analysis, it is a correlation-focused approach that seeks to reproduce the correlations among variables, where the factors are “representatives of the shared variance of the variables, excluding the unique variance to each individual” (Brown, 2006). In terms of the correlation matrix, this corresponds to focusing on explaining the off-diagonal terms (i.e., the shared covariance), whereas PCA focuses on explaining the terms on the diagonal. However, as a byproduct, when attempting to reproduce the on-diagonal components, PCA also tends to align well with the off-diagonal correlations.

3.1 Explaining the PCA method for constructing an economic development index

Since economic development is a qualitative concept and does not have a measurable quantity, to evaluate it, one must measure the indicators and variables that represent it and examine them all together to assess the qualitative concept of economic development. In this study, the variables of economic growth rate, Gini coefficient, unemployment rate, Legatum Prosperity Index, and Human Development Index are introduced as selected and proposed representatives of economic development.

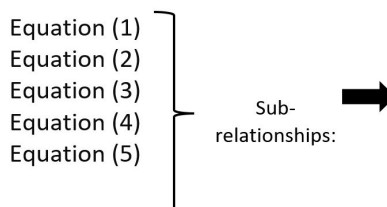
Continuing, based on the theoretical foundations of the research, the relationship between each of the representatives of the concept of economic development and the Land Price Index (LP) and the Construction Cost Index (ACB) is explained. Five sub-models have been developed, and in each of the sub-models, one of the representative variables of the concept of economic development is defined as an endogenous variable. Then, a composite index to measure economic development by the representative variables of the concept of economic development must be introduced. For this purpose, the proxy variables representing the concept of economic development are entered into the main research model as exogenous variables, and the Economic Development Index (EDI) is measured as an

endogenous variable; therefore, the representative variables of economic development are endogenous in the sub-models of the research, but exogenous in the main research model, and in practice, the relationship between the exogenous variables and the endogenous variable in the main research model will

$$\begin{aligned} \text{EGR} &= f(\text{ACB}, \text{LP}) \\ \text{GI} &= f(\text{ACB}, \text{LP}) \\ \text{UR} &= f(\text{ACB}, \text{LP}) \\ \text{LPI} &= f(\text{ACB}, \text{LP}) \\ \text{HDI} &= f(\text{ACB}) \end{aligned}$$

$$\begin{aligned} \text{EDI} &= f(\text{EGR}, \text{GI}, \text{UR}, \text{LPI}, \text{HDI}) \\ \text{EDI} &= f(\text{ACB}, \text{LP}) \end{aligned}$$

be analyzed. Accordingly, the variables Economic Growth Rate (EGR), Gini Coefficient (GI), Unemployment Rate (UR), Legatum Prosperity Index (LPI), and Human Development Index (HDI), which are representative variables of economic development, will be referred to as intermediary variables.



$$\begin{aligned} \text{Equation (6): (intermediate relationship)} \\ \text{Equation (7): (central equation)} \end{aligned}$$

To obtain the economic development index, which is a composite of the research's intermediary variables, PCA will be used. For this method to be applied, the intermediary variables must be correlated with the economic development index. Therefore, instead of GI, (1-GI) should be used as the measure of income distribution, and instead of UR, (1-UR) should be used as the measure of employment.

In the PCA method, the following steps must be followed in order:

- 1) The data must be normalized, so each data point is calculated by subtracting its mean and dividing by its standard deviation;
- 2) Let the variance-covariance matrix of the normalized data be formed;
- 3) The eigenvector from the variance-covariance matrix should be extracted, where these eigenvalue parameters are the weights (coefficients of importance) of the variables;
- 4) Finally, the weight of each variable must be multiplied by that variable's data. In this way, the desired composite index is obtained from the corresponding sum of each variable's coefficient in that variable.

This research covers 20 years from 1380 to 1400, and its data are of the time-series type, collected annually. The research data are at the national level and pertain to all urban areas of Iran. The data collection method is library-based, including documents and online databases.

For this research, inference and econometrics methods were employed. Since the research data refer to the period from 1380 to 1400, the research model is a multivariate time series. It is assumed that the land price index and the cost of construction and development have a significant relationship with economic development. For estimating the regression model, to standardize the variable units and examine the elasticity between the endogenous variable and the exogenous variables, all variables were taken to their natural logarithm, and to obtain the optimal model with maximum significant coefficients, variables at level I(0) were used. Variables at level I(0) were not stationary, so differential treatment was applied, and the regression model was estimated using the autoregressive distributed lag (ARDL) approach. To conduct an analysis of the research, the Eviews 12 software was used.

Table 2. Research data

Land price	Construction costs	Human Development Index	Legatum Prosperity Index	Unemployment rate	Gini coefficient	Economic growth rate	Variables and year
LP	ACB	HDI	LPI	UR	GI	EGR	Symbol
No unit	Ten thousand rials	Without unit	No unit	Percent	Without unit	Percent	Unit
5	664	0.693	45.71	14.8	0.3985	4.33	1380
6.8	8.1	0.701	46.05	14.3	0.4191	8.1	1381
9.3	9.6	0.704	46.48	12.8	0.4156	6.78	1382
11.3	1203	0.712	46.66	12.3	0.3996	7.63	1383
12.6	1412	0.717	46.57	13.8	0.4023	6.49	1384
14.2	1667	0.727	46.34	13.4	0.4004	9.74	1385
21.8	2248	0.733	46.09	12.5	0.4045	10.44	1386
31.1	3003	0.735	45.86	12	0.3859	1.1	1387
28.7	3010	0.738	46.18	13.5	0.3939	2.62	1388
28.7	3094	0.745	46.02	15.3	0.3813	4.76	1389
33.7	3492	0.754	45.7	13.7	0.375	-2.03	1390
52.9	4822	0.768	46.4	13.8	0.3834	-2.43	1391
85.4	6695	0.769	47.19	11.8	0.3952	3.85	1392
94.2	7959	0.773	46.81	11.6	0.399	3.01	1393
97.7	8983	0.776	46.49	12.2	0.3988	-0.02	1394
100	8735	0.786	47.21	13.7	0.4046	9.38	1395
106.8	9526	0.789	47.78	13.3	0.4008	6.91	1396
164.1	14313	0.787	48.48	13.5	0.4093	-2.48	1397
260.9	20388	0.783	48.92	13.8	0.3992	2.94	1398
548.3	36893	0.777	48.16	10.4	0.4006	0.41	1399
Central Bank of Iran	Central Bank of Iran	hdr.undp.org	Legatum Institute	Central Bank of Iran	Central Bank of Iran	Iran Statistics Center	Source

4. Research findings analysis report

Table 3. Weight coefficients of the EDI-aligned intermediate variables obtained from the PCA method

HDI	LPI	1-UR	1-GI	EGR	Intermediate variables aligned with EDI
20.27	7.32	1.25	0.37	5.27E-05	Weighting coefficient

Equation (8):

$$EDI = [5.27E-05 * EGR] + [0.37 * (1 - GI)] + [1.25 * (1 - UR)] + [7.32 * LPI] + [20.27 * HDI]$$

Table 4. Data obtained from the PCA method for the EDI variable

Year	Data	Year	Data	Year	Data	Year	Data
1380	890.21	1385	966.18	1390	1015.86	1395	1091.76
1381	910.24	1386	977.63	1391	1049.23	1396	1102.51

Year	Data	Year	Data	Year	Data	Year	Data
1382	921.33	1387	980.63	1392	1059.52	1397	1103.32
1383	939.50	1388	987.18	1393	1065.10	1398	1100.56
1384	947.1.	1389	977.96	1394	1068.09	1399	1048.58

4.1. Descriptive analysis of variables

Table 5. Descriptive statistics of the s for each variable

D(ln(EDI))	ln(LP)	D(ln(ACB))	Variable
0.01	3.81	0.21	Mean
0.01	3.52	0.18	Median
0.03	6.31	0.59	Maximum
-0.02	1.92	-0.03	Minimum
0.01	1.20	0.15	Std. Dev.
-0.19	0.27	0.60	Skewness
3.36	2.26	3.25	Kurtosis
0.22	0.66	1.20	Jarque-Bera
0.90	0.72	0.55	Prob.

4.2 Inferential analysis of variables

Table 6. Feedback on the stationary test of variables

Prob.	Statistic T-statistic	Rank Differencing	Tests include: width from origin, detrending, and none	Variable
0.06	-2.96	I(0)	Offset	D(ln(ACB))
0.05	-3.68	I(0)	Offset and detrending	ln(LP)
0.06	-1.89	I(0)	None	D(ln(EDI))

The variable D(ln(ACB)) with intercept and no trend is (Table 6)

significant at the 90% confidence level. (Table 6)

The variable ln(LP) with intercept and without trend

removal is significant at the 90% confidence level.

The variable D(ln(EDI)) without intercept and trend is

significant at the 90% confidence level. (Table 6)

Table 7. Short-run ARDL model estimation coefficients

Variable	Coefficient	Standard Error	T-statistic	Prob.
D(ln(EDI(-1)))	0.10	0.12	-0.86	0.41
D(ln(EDI(-2)))	0.56	0.20	2.85	0.02
D(ln(ACB))	-0.14	0.04	-4.06	0.00
D(ln(ACB(-1)))	-0.04	0.02	-2.41	0.04
ln(LP)	0.10	0.03	3.02	0.01
ln(LP(-1))	-0.10	0.03	-3.06	0.01
C	0.03	0.01	4.25	0.00

Variable	Coefficient	Standard Error	T-statistic	Prob.
R-squared	0.73	Mean dependent var		0.01
Adjusted R-squared	0.57	Standard deviation of the dependent variable		0.01
Standard Error of Regression	0.01	Akaike information criterion		-6.76
Sum of squared residuals	0.00	Schwarz criterion		-6.41
Log likelihood	64.43	Hannan-Quinn criterion.		-6.72
F-statistic	4.49	Durbin-Watson stat		1.98
Prob. (F-statistic)	0.02		---	

Equation (9):

$$D(\ln(EDI)) = 0.10 * D(\ln(EDI(-1))) + 0.56 * D(\ln(EDI(-2))) - 0.14 * D(\ln(ACB)) - 0.04 * D(\ln(ACB(-1))) + 0.10 * \ln(LP) - 0.10 * \ln(LP(-1)) + 0.03 + \epsilon$$

Analysis of tests of the model's classic regression assumptions

Table 8. Feedback on the test of the assumption that the mean of the residual terms of the model is zero

Feedback	Mean statistic
Very close to zero.	17-E2.16

The null hypothesis that the mean of the model residuals is zero is accepted. (Table 8)

Table 9. Residuals-based test of the existence of heteroscedasticity

Feedback	Prob.	F-statistic
The residuals are assumed to have equal variance.	0.55	0.38

The model residuals are at the 90% confidence level, (Table 9) indicating homoscedasticity and no heteroscedasticity.

Table 10. Feedback on the hypothesis test for the absence of autocorrelation among the model residuals

Feedback	Prob.	F-statistic
There is no autocorrelation among the residuals.	0.81	0.22

There is no autocorrelation among the model residuals at the 90% confidence level. (Table 10)

Table 11. Feedback on the normality assumption test for the model residuals

Feedback	Prob.	F-statistic
The distribution of the residuals is normal.	0.09	4.78

The distribution of the model residuals at the 90% confidence level is normal. (Table 11)

Table 12. Feedback on the presence of structural failure in the model

Feedback	Years of CUSUM line collision with control lines
CUSUM line without collisions with control lines	Has no collisions with control lines.

The model does not have a structural break. (Table 12) 4.3. Estimated coefficients of the long-term model

Table 13. Coefficients of the long-term model estimates

Prob.	T-statistic	Standard Error	Coefficient	Variable
0.05	-2.19	0.16	-0.34	D(ln(ACB))
0.06	-2.14	0.00	-0.01	ln(LP)
0.01	3.00	0.02	0.06	C

Equation (10):

$$D(\ln(EDIt)) = -0.34 * D(\ln(ACBt)) - 0.01 * \ln(LPt) + 0.06 + \epsilon t$$

Table 14. Test of the model's long-term relationship

Signif.	I(1)	Value	I(0)
10%	3.35	5.25	2.63
5%	3.87		3.10
2.5%	4.38		3.55
1%	5.00		4.13

The model has a long-term relationship with a 99% confidence level. (Table 14)

Table 15. Model error correction test feedback

Feedback	Prob.	Coefficient
The model's short-term and long-term relationships converge exponentially.	0.00	-0.54

In each period, 54% of the gap between the short-run and long-run relationship is adjusted in the model, and the short-run model converges exponentially toward the long-run model with a 90% confidence level. (Table 15)

5. Discussion, conclusion, and recommendation

5.1. Findings

1) In the long run, the construction costs in Iran during the 1380 to 1400 period had a negative and significant impact on the country's economic development, and a 1 percent increase in construction costs reduced economic development by 0.34 percent. (Equation 10) The -0.34 coefficient indicates that rising construction costs, by reducing investment activity and cutting employment in the construction sector, have slowed the country's economic development. In the Iranian economy, construction is one of the economy's driving sectors, with strong backward and forward linkages to the metal, cement, technical services, and financial industries. When construction costs (whether for materials, labor, or permits) increase, the return on investment in public infrastructure projects decreases;

as a result, investors lose the incentive to enter this sector. The reduction in investment and the construction slump led to lower employment, reduced production of building materials, and ultimately decreased household incomes. Therefore, in the long run, a 1 percent increase in construction costs results in about a 0.34 percent decline in the economic development index, as its effects ripple through the entire economy. In other words, this negative coefficient reflects the inhibitory effect of an increase in construction investment costs on growth, employment, the Gini coefficient, human development, and social welfare.

2) In the long run, the price of land in Iran during the period from 1380 to 1400 had a negative and significant impact on the country's economic development, and a 1% increase in land price led to a 0.01% decrease in economic development. (Equation 10)

The coefficient of -0.01, although small, is economically significant and indicates that the increase in land prices has caused the transfer of financial resources from productive activities to unproductive activities and speculation in the land market. In Iran, land is not

only a factor of production in the construction sector but also a capital asset that plays an important role in capital allocation. The increase in land prices causes the marginal cost of producing housing and public works projects to rise; as a result, many projects become economically unviable. Furthermore, the increase in land prices has strengthened the incentive for speculation in the asset market, causing capital to be diverted from the productive and employment-generating sector to unproductive transactions. In this, a long-term 1% increase in land prices has led to a 0.01% decline in the economic development index, as the rise in prices of unproductive assets like land results in a decrease in productive investment and a slowdown in economic growth.

3) Since the economic development index in this research was derived from a combination of five variables—economic growth rate, Gini coefficient, unemployment rate, Legatum Prosperity Index, and Human Development Index—and since economic development is also defined in economics inclusively and comprehensively, the small regression model coefficients are reasonable. Because changes in land prices and construction costs cannot so dramatically affect a country's economic development index as to influence a nation's economic development, it requires various factors and larger drivers. However, in this study, the effect of those factors was scientifically proven.

5.2. Research limitations

The data for the study, concerning the land price index and the cost of form and construction, pertain to urban areas of Iran and do not include rural areas. However, it is considered that the study's results are also generalizable to rural regions and will encompass all areas of the country.

5.3 Application of the research findings and policy recommendations

1. The cost of construction in the building industry acts as a barrier to the sector's prosperity and to economic development. By reducing the negative impact of for and construction, one can contribute to the prosperity of the construction sector and the country's economic development. To achieve this goal, the solution is to grant sufficient credits to finance the building industry, it is suggested.

2. Reducing land prices can significantly lower a large portion of the initial costs of construction, and by

lowering land prices, the volume of construction increases, thereby improving the country's economic development. Three solutions for government agencies are proposed to reduce land prices:

a) Increasing land supply through development, creating satellite cities, and establishing new urban areas;

b) Increasing the density of buildings and high-rise construction, of course, in suitable and friendly areas, can reduce the need for land and, by lowering land demand, also lower its price;

c) Implementing financial policies and imposing heavy taxes on undeveloped, high-transaction land to curb land speculation and strip away its capital nature, ultimately achieving a more consumptive character.

3. Since the construction industry has extensive backward and forward linkages, has a positive and significant relationship with economic development, and is an industry that impacts various dimensions of the economy, improving all these dimensions in a coordinated manner, attention to the construction industry must therefore be as a strategic policy for the medium and long term on the agenda of government bodies in order to leverage the capabilities of this sector of the industry. The construction industry should be utilized as an economic driver to improve the country's economic and social situation, thereby increasing economic development.

Authors' Contributions

The authors participated in the research.

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Conflict of Interest

The authors have declared no conflict of interest.

References

- Akbari, M. (2020). Analysis of Social Welfare Index in Iran (Case Study: Metropolis of Shiraz). *Social Development & Welfare Planning*, 11(42), 103-125. Doi: [10.22054/qjsd.2020.11923](https://doi.org/10.22054/qjsd.2020.11923). [In Persian]
- Akhavan Fard, R. (2012). Income Distribution in Mazandaran Province during Economic, Social and Cultural Development Programs. *Monthly Economic Journal of Economic Issues and Policies*, No. 1, 27-40, <http://ejip.ir/article-1-1-1-fa.html>. [In Persian]

- Arabi, Z. & Kazemi, A. (2014). The Effect of Human Development Index on Iranian GDP. *Economic Growth and Development Research*, 5(17), 124-109, 20.1001.1.22285954.1393.5.17.7.1. [In Persian]
- Athari, K. (2011). The First Report on the Social Situation of Iran (1380-1388), Rahman Institute. [In Persian]
- Babakhani M. (2008). Economic Development, Income Inequality and Health in Iran: 1355-1385. *Refahj*, 7(28), 239-262. URL: <http://refahj.uswr.ac.ir/article-1-2038-fa.html>. [In Persian]
- Bakhtiari, M. (1992). Feasibility study of the hypothesis of conflict between growth and balanced income distribution: Case study of Iran (1968-1970), Master's thesis, Allameh Tabatabaee University, Faculty of Economic Sciences. [In Persian]
- Barnett, T. P. & Preisendorfer, R. (1987). Origins and Levels of Monthly and Seasonal Forecast Skill for United States Surface Air Temperatures Determined by Canonical Correlation Analysis. *Monthly Weather Review*, 115(9), 1825-1850. <https://doi.org/10.1175/1520-0493>
- Brown, Timothy A. (2006). Confirmatory Factor Analysis for Applied Research Methodology in the social sciences, Guilford Press.
- Chachlakis, Dimitris G.; Prater-Bennette, A. & Markopoulos, P. (2019). L1-Norm Tucker Tensor Decomposition. *IEEE Journal of Selected Topics in Signal Processing*, 15(3), 587-602, doi: [10.1109/JSTSP.2021.3058846](https://doi.org/10.1109/JSTSP.2021.3058846)
- Dezaji, M. & Ketabforosh Badri, A. (2014). The Effects of Human Development on Labor Productivity in Selected OECD Countries. *The Journal of Productivity Management*, 4(8), 125-140, 20.1001.1.27169979.1393.8.4.6.8. [In Persian]
- Dlamini, S (2014). The relationship between the construction sector and economic growth, School of Construction Engineering and Management, University of Reading, UK.
- Dogan C. & Topuz, J. C. (2020). Real effects of real estate: evidence from unemployment rates. *Studies in Economics and Finance*, Emerald Group Publishing Limited, 37(4), 605-623, Doi: [10.1108/SEF-03-2019-0124](https://doi.org/10.1108/SEF-03-2019-0124)
- Ebrahimi, M. (2015). A look at social welfare research in Iran; focusing on scientific and research articles in the period 1993-2001. *Social Security Journal*, 13(5), 5-37. [In Persian]
- Faraji, F., Ehsanifar, T., Naderi, N. & Rezaei, B. (2015). The Study of the Role of Entrepreneurship in Economic Development. *Journal of Studies in Entrepreneurship and Sustainable Agricultural Development*, 1(4), 91-104, 20.1001.1.24767735.1393.1.4.6.7. [In Persian]
- Ferreiro, J. & Gomez, C. (2019). Employment Protection and Labor Market Results in Europe. *Journal of Evolutionary Economics* 30, 401-449, <https://doi.org/10.1007/s00191-019-00656-5>
- Hughju, N. (2003). Social Welfare and Development, Functions of Supportive Institutes. *Refahj*. 2(6), 75-96, URL: <http://refahj.uswr.ac.ir/article-1-2194-fa.html>. [In Persian]
- Hajamini M. (2020). Assessment of Employment Status in Fourth and Fifth Economic, Social and Cultural Development Plans. *Qjerp*, 27 (92), 7-43. URL: <http://qjerp.ir/article-1-2377-fa.html>. [In Persian]
- Houshmand, M. & Noghabi, M. (2015). The role of the country's economic development in employment and the labor market. Second International Conference on Futures Studies in Management and Economic Development, Torbat Heydariyeh University, Mashhad. [In Persian]
- Hsu, D., Kakade, Sham M. & Zhang, T. (2012). A spectral algorithm for learning hidden markov models. *Journal of Computer and System Sciences*, 78(5), 1460-1480, <https://doi.org/10.1016/j.jcss.2011.12.025>
- Jolliffe, Ian T. & Cadima, J. (2016). Principal component analysis: a review and recent developments. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 374, <http://doi.org/10.1098/rsta.2015.0202>
- Khalili Iraqi, M. (1999). Explaining the mutual relations between the housing sector and other economic sectors. Ministry of Housing and Urban Development. [In Persian]
- Kindleberger, Charles P. (1958). Economic Development, translated by Sadoughi, Reza. Rasht, 1972, Lahijan, Gilan School of Management, page 7. [In Persian]
- Kirzner, I.M. (1973). Competition and Entrepreneurship, University of Chicago Press, Chicago, page 2487
- Kuehner-Hebert, K. (2022). Number of Construction Jobs, Unemployment and Costs on the Rise, According to Report. Electrical Contractor Journal, www.ecmag.com/magazine/articles/article-detail/number-of-construction-jobs-unemployment-and-costs-on-the-rise-according-to-report
- Liu, Z., Miao, J. & Zha, T. (2013). Land Prices and Unemployment, *Journal of Monetary Economics, Elsevier*, 80(C), 86-105, Working Paper 19382, DOI: [10.3386/w19382](https://doi.org/10.3386/w19382)
- Lucien, J. & Morson, C. (1994). Analytical study of income distribution and economic development, translated by Ahmad Akhavi, Tehran, Ministry of Foreign Affairs Publications, first edition, 132-133. [In Persian]
- Maleki, S. (2003). Sustainable City and Sustainable Urban Development. *Quarterly Journal of Housing and Revolution*, 2(1), 3-54. [In Persian]
- Markopoulos, P. P., Kundu, S., Chamadia, S. & Pados, D. A. (2017). Efficient L1-Norm Principal-Component Analysis via Bit Flipping. *IEEE Transactions on Signal Processing*, 65(16): 4252-4264, doi: [10.1109/TSP.2017.2708023](https://doi.org/10.1109/TSP.2017.2708023)
- Mayo, S. K. (1998). Land Prices, Land Markets, and the Broader Economy, Lincoln Institute of Land Policy.
- McKenzie, Sh. (2023). What Is Entrepreneurship and Economic Development?, Essentials of Entrepreneurship-Led Economic Development.
- Meyer, D. F., Masehla, T. M. Kot, S. (2017). The Relationship between Economic Growth and Economic Development: A Regional Assessment in South Africa. *Journal of Advanced Research in Law and Economics*, Volume 8, Issue 4(26), 1377-1385, retrieved from <https://journals.aserspublishing.eu/jarle/article/view/1547>
- Mojtahed. A. & Ahmadyan, A. (2007). Welfare Effect of Exchange Rate Policy in Iran. *Iranian Journal of Economic Research*, 9(30), 1-21. https://ijer.atu.ac.ir/article_3646.html?lang=fa. [In Persian]
- Potter, B. (2016). How much do construction costs matter? Some factors that affect the price of housing, Construction Physics Journal.
- Roobahan, M. (2008). Fundamentals of Economic Development, Tehran, Taban, 12th edition, 172-173. [In Persian]

- Saeedi, K. (2007). Theories of Development Laws, Tehran, Culture and Art Entrepreneurs Cooperative Company Publication, First Edition, Page 74. [In Persian]
- Sharif Khatibi, L (2008), Human Development Index. *Rahyaf Journal*, 18(42), 20.1001.1.10272690.1387.18.42.6.5. [In Persian]
- Sun, Q., Feng, Y., Tang, Y., Kuang, W. & Javeed, S. A. (2022). The relationship amid land finance and economic growth with the mediating role of housing prices in China. *Frontiers in Psychology*, Volume 13, <https://doi.org/10.3389/fpsyg.2022.976236>
- Suri, T., Boozer, M.A., Ranis, G. & Stewart, F. (2011). Paths to Success: The Relationship between Human Development and Economic Growth. *World Development*, 39(4), 506-522, <https://doi.org/10.1016/j.worlddev.2010.08.020>.
- Terner Center (2020). The Cost of Building Housing Series, Research and Policy Journal, www.ternercenter.berkeley.edu/research-and-policy/the-cost-of-building-housing-series/
- Yousefi, M. (2009). Strategies for Economic Growth and Development, Tehran, Ney, 27-34. [In Persian]
- Wennekers, S. & Thurik, R. (1999). Linking Entrepreneurship and Economic Growth. *Small Business Economics*, 13(3), 27-56, <https://doi.org/10.1023/A:1008063200484>

