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Structural Equation Modeling of Effective Economic and Cultural Components on Energy Consumption Behavior in Urban Societies

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Abstract: Energy consumption efficiency is one of the most important concerns in urban communities allotted more than 70 percent of Iran's population to itself. Since energy efficiency index that is one of the targeted components in resistance economy policies has been reduces, it is necessary to design and adopt comprehensive, efficient, and integrated policies in order to improve efficiency and productivity of energy consumption in Iran. Energy consumption optimization in urban communities is affected by different factors and components. One of influential components is socio-cultural factors. This is because of an element named consumption attitude and behavior among any household's member that has socio-cultural roots, and consequently only socio-cultural tools are effective on its change and reform, but this type of factors has been less considered by researchers in analysis of consumption behavior. In this research, energy consumption behavior in urban community has been analyzed with socio-economic approach and by using data based on experts' view in this area, factor analysis technique, and LISREL Structural Equation Modeling (SEM), it was analyzed exactly and scientifically. According to the results from the mentioned model, economic policies, whether price ones or non-price ones, do not have acceptable impact to improve and reform energy consumption behavior in urban community. There is a poor relationship between this type of components and energy consumption behavior in urban households. On the contrary, social and national beliefs and norms have significant impact on consumption behavior. Currently, they are main source of forming and directing energy consumption model in Iran's urban communities. However, the potential impact of religious and moral values on social and national beliefs and norms has been proved. Given direct impact of this type of socio-cultural components on energy consumption behavior in urban society, high capacity can be regarded for religious-ethical views and values to improve consumption behavior in urban community.

Keywords: energy consumption, energy consumption behavior, economic policies, structural equation modeling, socio-cultural components
JEL Classification: E21, P46, D04, C54

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1-Introduction

Productivity and efficiency are some of the necessary components to achieve resistance economy policies. The three paragraphs of the twenty-four paragraphs of these policies (paragraphs 3, 8 and 20) address this issue. Energy as a strategic commodity, both in the production sector and in the consumption sector, is of particular importance. It is the main issue in the assessment of productivity and efficiency, meanwhile the role of the household sector is very important. According to statistics, Iran's energy consumption in recent years is 1200 million barrels of crude oil (3287671 bpd), of which 37% is for the domestic and commercial sector, 27% for the transportation sector, 23% for the industrial sector, 4% agriculture and the rest is related to other uses. With this current state, you can save up to 30% of this amount (www.bazpors.com). On the other hand, given that an important part of energy consumption in the transportation sector belongs to the household sector, it can be said that about half of the energy consumption in the country belongs to the household sector and it has the largest share in the energy consumption of the country. According to Statistical Center of Iran, (based on the census of 2011), only 28.5% of the country's population is in the rural sector and more than 71% of the country is urban population, and the share of energy consumed by urban households is significant; more than one-third of the energy consumed by the entire country. Therefore, energy consumption management in urban societies will have a significant impact on energy efficiency throughout the country and hence on the economy of the country. In particular, the per capita consumption of energy in Iran is 68 percent more than the global average. As well as other issues such as the fact that the energy consumption of any household in Iran is over 2900 kW / h, which is more than three times compared to the global average annual consumption of electricity per household (900 kWh). The per capita consumption of gasoline in Iran is six times of the global average, and gas per capita is more than triple and water per capita is twice the global average (Khoshkhooy, 2015). Given the considerations such as the sanctions conditions of the Iranian economy, the strong dependence of the Iranian economy on energy resources, particularly the decreasing resources of oil and gas, increasing energy consumption in Iran, the continued reduction of energy reserves and the production of them, the inefficient and profitable pattern of energy consumption in Iran, and the energy efficiency index has declined in the past decade, which is one of the targeted components of resistance policy, it is imperative that comprehensive, efficient and coherent policies to be designed and implemented to improve efficiency and productivity of energy consumption in Iran because consumption in a community plays an important role in determining the type, amount and form of production and distribution, and on the other hand, it is influenced by the conditions and culture of society. If the situation of society is such that it leads people to use more, most of the resources of society are consumed, the level of savings will be reduced and there will be no suitable ground for investment. It also brings down production and social poverty, and economic weakness provides the basis for cultural poverty and social degradation and increases the vulnerability of society to crises (Vahida et.al., 2010).

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The issue of optimizing energy consumption in urban societies is influenced by several factors and components that socio-cultural factors are one of these influential components. This is due to the existence of an element called attitude and behavior among members of every family that has socio-cultural roots and, therefore, only social-cultural instruments are subject to change and reform. In particular, the position of socio-cultural components and their impact on consumption patterns and consumer behavior in urban communities, due to complexity and widespread use of social structures and processes, becomes more important than the simple rural society. Therefore, the study and recognition of the components and social processes and their type and extent of their impact on the attitudes and behavior of consumption in urban societies becomes more and more important. However, with a look at previous researches, we find that these categories of factors have been considered by the researchers less in the analysis of consumer consumption and consumer behavior and what has been more analyzed is energy supply policies and technical-economic instruments, or in a few cases that socio-cultural factors have been expressed as factors affecting energy consumption, their overall impact has been examined.

Generally, in relation to the issue of energy management and increasing the efficiency of consumption in the household sector, existing methods can be categorized as follows:

1. Economic instruments that include pricing and non-pricing tools and policies, including tax policies (subsidies), policies for the liberalization of prices for energy carriers and investment in technical and infrastructural areas.

2. Non-economic tools; the most important of which can be to correct consumers' behavior by modifying cultural and social attitudes and norms.

Many scholars consider failure to perform accurately and use of costly and non-economic policies as the reason for failure to achieve the policies of energy consumption optimization. On the other hand, several studies done so far indicate that short-term price elasticity and long-term price elasticity demand of energy carriers at macro and sectoral levels are low. Accordingly, pricing policies do not have much to do with controlling energy demand and the potential for savings due to rising carrier prices is not high. Therefore, in this research, for two reasons, the socio-cultural approach to energy consumption in the household sector has been emphasized. Firstly, the analysis of energy consumption management takes place in the urban community and urban households, which has a high impact on social relationships and structures. Secondly, pricing policies have little potential to control energy demand and hence to improve energy efficiency in our society. This indicates that the pattern and behavior of people in our society are originally more socio-cultural than price and cost, and therefore, socio-cultural policies and tools should be used to manage and influence it.

In the present research, we have tried to explain the following issues:

1. What is the need to pay attention to the cultural and social factors affecting consumer behavior in urban society, along with economic factors?

2. How the indicators related to each of these components and its conceptual model can be extracted?

3. How is the importance and impact of each economic and cultural factor on

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energy efficiency and urban efficiency improvements? (To address this issue, Structural Equation Modeling (SEM) and data analysis were used in Lisrel software).

4. How is the comparison of the significance of these factors and the related indicators to each one, and what are its practical results?

2. Literature Review

a) Foreign Researches

Barr et.al, (2011) did a research using survey method and field studies in England based on an factor analysis method, they identified three groups of consumers with distinct lifestyle that have a high, medium, and low commitment respectively to environmental norms. They concluded that consumer habits in any environment are influenced by verbs and social habits prevailing on the environment, such as those who use the indoor environment, their consumption behavior, and environmental norms, but when staying outdoors (trips, holidays, etc.), its consumption approach is influenced by the norms of the new social environment.

Illouz (2009), in a documentary-based and library-based research study, analyzes the impact of emotions and ideas in the sociology of space on consumption, and states that unknown feelings, when dealing, buying and consuming, can be very involved in human selection, but through cultural tools, it is easy to pay attention to directing these feelings or injecting a specific type of it to the consumer. On the other hand, in the space of consumption, these feelings may turn into cultural illusions in society, or they can form a collective and national feeling in the national space and society and affect individual's consumption pattern, which can even be a sense of confrontation and political opposition.

In a study entitled " Economic sociology and the social problem of energy inefficiency" based on documentary and library studies, Biggart & Lutzenhiser (2007) concluded that economic sociology should be addressed in order to understand and achieve solutions to socio-economic problems and relevant problems should be analyzed with a sociological approach. The most important example is the inefficiency of energy consumption in the housing and construction sector that currently economic sociology offers useful alternatives to economic-theory-based policies in analyzing this phenomenon.

b) Iranian Researches

Tari & Gholami Baghi (2011) found in the research using the documentary and analytical method that in addition to economic factors, several cultural factors are effective on determining the pattern of consumption in society, including 1. Religious beliefs 2. The impact of household consumption patterns on the individual based on the adaptation and reconciliation between the demands of the household members or, more importantly, based on household decision-makers' recognition and expediency 3. The recycling culture 4. Demonstrative use (consumption) 5. Conspicuous and rivalry consumption 6. Advertisement.

Amini et al. (2010), in a study entitled "Social Strategies as Non-Pricing Alternatives to Solve the Pattern of Energy Consumptiom in the Country", which was based on the results of library studies and surveying and field studies, based on the specific features of the Islamic Republic of Iran in energy management has designed the components and the elements of the proposed model. Accordingly, the effective

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factors in the energy sector in order to reduce energy losses and the use of renewable energy include government laws, education, technology, religion, economics, values and beliefs and, finally, geography.

In a documentary study, Musaee (2009) explores the role of culture on consumer patterns. These results were obtained from the study of the relationship between cultural components and patterns of consumption: 1. The main components of consumption, i.e., the level of consumption, the composition of consumer goods and how they are consumed, are formed in the context of community culture, and the Islamic rules governing consumption also affect all three components. 2. The pattern of consumption of our society is far from the pattern of domestic production and the optimal consumption pattern from the religious point of view.

3- Theoretical Framwork

Energy optimization policies, such as other economic policies, can be studied both on demand and on the supply side of energy (Isariannia, 2009). In supply policies, energy conservation is a concern. This means that is necessary to make optimal use of end-of-life sources of energy, as well as to improve efficiency in this section. In this study, given the subject matter, these categories of policies are not considered, but demand policies can be divided into two broad categories of pricing and non-price ones.

According to conventional economic logic, relative prices are the main factor forming consumer behavior and ones decision about the type of consumption, and price corrections lead to resource reallocation. Any household's decision to use or not to use costly optimization measures involves indebtedness between the current cost optimization and the expected future reduction of the cost of energy resulting from the optimization. The more current or expected price of energy is, the better optimization will be. Modifying energy prices creates the incentive to save energy. This means, when energy costs are modified, saving will be economical. The most important policies in this area are price modification through the elimination of overt and covert subsidies and the taxation of energy consumption. The price adjustment of energy is facing a number of difficulties and considerations that have led to a delay in decision making about it in our country for more than two decades, and there is still no consensus or coincidence on how to apply it. On the other hand, short-term price elasticity and long-term price elasticity demand for energy carriers in the country are low in macro and sectoral level; therefore, price policies do not have much to do with demand control and the potential for savings due to rising prices is not high (Soheyli, 2002).

The factors affecting energy consumption can be divided into five categories: 1. Is it necessary to use energy consumables or not? 2. What type of energy consumption will be selected for energy consumables? 3. What kind of energy efficiency and productivity are these devices to be chosen? 4. Is it possible for the consumer to choose and access to high-end products, or not? 5. At what price to be used the selected energy? According to this opinion, the last factor affecting the optimal energy consumption is its price, and the rest is non-priced ones (Sattari, 2010).

In terms of non-price policies, the analysis is more complex and wider. These policies can be integrated into economic

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and non-economic ones. Among issues related to non-pricing economic policies, government facilities and grants to specific producers or consumers, improvement of the business environment and related activities, as well as income policies (such as the fair and targeted distribution of subsidies) can be mentioned.

To analyze non-economic policies, other branches of the social sciences, including economic sociology, should be used, and, from other angles, the consumer behavior and energy efficiency. Consumer behavior and energy efficiency need to be looked at from other angles. In theories and studies of sociology in the field of consumer behavior, in terms of the formation of consumption and the role of various cultural and social elements in it, various literature has been produced that considered less attention in the economic studies because, firstly, the impact of culture and other economic components are assumed "given" in these studies. Secondly, the study of the social role of culture is considered to be outside the realm of economics while this discussion plays a fundamental role in the study of consumer behavior and its correction. On the other hand, the reform of consumption patterns is the main social and cultural goal of people seeking sustainable development and environmental goals (UNESCO, 2001). It can also be addressed within the context of the American institutionalization school. The school focuses on the role of structures and institutions in economic life. Institution is counted as an organized pattern of collective behavior, fully incorporated and accepted as a fundamental element of culture. Institutions include traditions, social and legal habits, ways of thinking and way of life. For example, the right to use resources and their use and belief in it is an institution. Structuralists believe that economic life will be regulated by economic institutions, not merely by economic laws (Gorji, 2005). From their point of view, the motivation to provide economic needs is influenced by culture. These are the beliefs and customs that dominate the amount and how to meet the needs. If the family is viewed economically, then it should be acknowledged that common ideas and beliefs in the family are applied by economic directors of this institution (parents) that are applied on how to use. It is not so that members act as they want and pay unnecessary expenses for their parents. Another thing is common use. Parents plan their family spending with their management patterns to have the ability to deal with it in case of crisis. This feature exists in most cultures by combining different social classes, but in order to address the issue of urban consumer behavior with sociology approach, it should be stated that the sociologists consider consumer behavior due to pressures and movements of the group that creates incentive to buy and use goods or services in individuals or another group (Cundiff, 1973). Their study in this area mainly relies on the importance of reference groups and social classes, especially the process of disseminating information in the community. From a sociological point of view, the features of all social behaviors of high popularity are permanent, sustainability and continuity. Accordingly, human behavior can be divided into two categories: sustainable behaviors and unstable ones.

Sustainable behaviors are behaviors that are repeated and have a consistently stable format. Sometimes these behaviors are individual and sometimes they are

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more common among the population and, if they are of high publicity, they are considered social behaviors. The consumption pattern in society is one of social behaviors because it has all its features. Its generality and its sustainability can be mentioned, and consequently, a kind of repetition is seen in it and is visible in relatively constant formats. Sustainable behaviors are the result of community culture. In fact, if culture is a medium and immaterial environment created by humans in the long term and accepted by the majority of society, then the features of culture are:

1- It is immaterial 2- It is developed by man 3- It is commonplace 4- Its change takes time.

Consequently, if it is accepted that the pattern of consumption is social behavior, in that case, it should be accepted that its fundamental change requires a change in culture and it is impossible to change the pattern of consumption from the current state to the optimal state only with the determinative economic variables (Moosayi, 2009).

Thus, the pattern of consumption of society, and in particular the urban community, is one of the sustainable economic behaviors of society and it has all the characteristics of sustainable social behavior, so their roots are completely cultural. In fact, the pattern of consumption of urban society is the result of its consumption culture and has a close relationship with its fundamental values and accepted norms (Sadeghi & Khoshkhooy, 2014).

An analysis of the impact of cultural components on consumer behavior in the framework of microeconomic consumption theory

In the theory of consumption in the micro-economy, in order to obtain a consumer balance point which indicates the optimal choice of the person to use goods or services, two basic concepts of the indifference curve (or desirability) and the budget constraint are used. Thus, in a hypothetical space of two commodities such as Fig. 1, by drawing the curvatures of indifference and consumer constraint, the o touch point of the highest curvature of indifference to the individual's budget constitutes an optimal point of consumption, or its equilibrium point, indicating its consumption of goods X and Y , will be obtained. In Diagram. 1, U shows the same indifference or utility curve, M, budget constraint, and E, the balance point, or the optimal consumer choice.

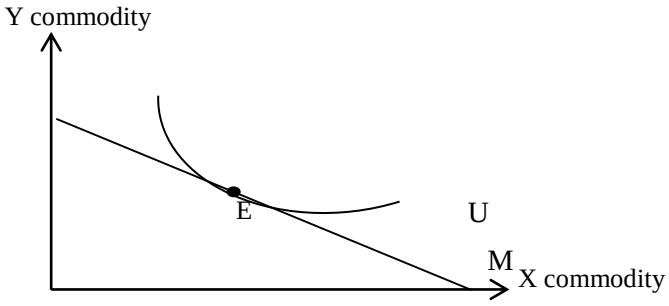


Diagram1. The curvature of indifference and consumer constraint
Reference: (Mas-Collel & Whinston, 1995)

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Given that PX is the price of goods X and PY, the price of goods Y and M of consumer income, at the point E, the following relationships will be established:

Consumer budget constraint: $M = P_x X + P_y Y$

$\bar{U} = U(X, Y, \bar{\delta})$: same indifference curve or consumer desirability

$MRS_{x,y} = -\frac{\Delta y}{\Delta x} = \frac{P_x}{P_y} = \frac{MU_x}{MU_y}$ At the point of consumer balance

In this theory, the desirability of the consumer and, hence, his indifference curve is given and assumed by his preferences, tastes and other mental aspects (δ^{-}); therefore, the budget constraint always changes with the change in consumer income (in parallel) or the relative price change of the goods or services (unevenly) and, by contacting the consumer's highest indifference curve, yields the balance of consumption. Thus, in diagram 2, assuming that X is the energy commodity and Y is money (as the representative of other consumer goods), by applying a pricing policy and raising energy prices, the consumer budget will change from M_0 to M_1 and seek it consumes individual balance from E_0 to E_1 and, correspondingly, reduces energy consumption from X_0 to X_1. However, how much energy consumption will be reduced depends on the price elasticity of consumer demand because if the price elasticity of demand for energy is low and so does its demand function, energy price changes should not expect a significant change in energy consumption. In this case, with the assumption of a current increase, the consumer may be placed at the E_3 point instead of the E_1 point in Diagram. 3 and there is not much change in his energy demand, which is what we now face in the community.

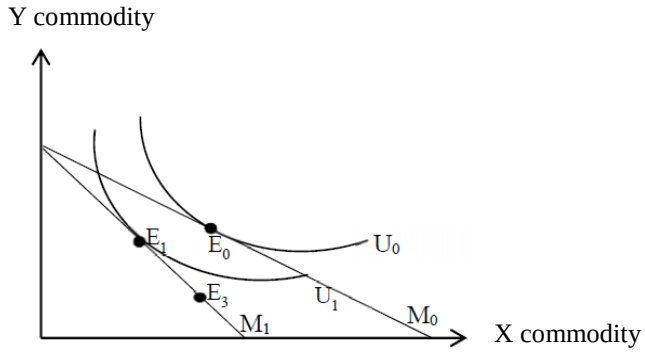


Diagram2. The study of the impact of pricing policy on energy consumption within the framework of the theory of consumer behavior
Reference: (Mas-Collel & Whinston, 1995)

Now, the question is that if using socio-cultural policies, how can one justify changes in the person's consumption in the space described by the consumer behavior theory? How does this non-priced policy affect the consumer's balance of consumption and how does it move?

What happens to the consumer, after the impact of social-cultural policies, is that it creates norms, attitudes and mental beliefs or behavioral habits that alter a person's mindset about the consumer (energy) or increases the mental value of this commodity to him than before. The concept of subjective value has already

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been addressed to the consumer in the theory of consumer behavior before this change of mindset; so that in this theory, $MRSx,y = \frac{P_x}{P_y} = \frac{MU_x}{MU_y}$ is equal to the same subjective value of the consumer for commodity X. But the point is that this concern and subjective value created by the consumer after the process of influencing cultural-social components are affected something beyond the price component and those are the same new values and concerns that arise from the new person's perception, attitude and mentality, or his new habits, but how can these newly created mental values come into the analysis of consumer theory in microeconomics?

Since cultural and social components target individual's subjective and normative values, in order to analyze the changes in the balance of consumption, we must look at the utility of the individual and his indifference curve (which, according to the theory of consumption, is considered mental, given, and exogenous). Therefore, in the equation relating to the final rate of succession ($MRSx,y = \frac{P_x}{P_y} = \frac{MU_x}{MU_y}$), changes in mental worth have to be modeled and applied in the theory through the appropriateness of the final utility of two commodities ($\frac{MU_x}{MU_y}$). To clarify this, it can be stated that by increasing the amount of energy consumed by a person in energy (x) in the first state (that is, before applying the related cultural-social policy) than the secondary state (which is the individual's sensitivity to the need to modify the energy consumption behavior has been motivated), his utility increases to a greater extent because in the latter case, created sensitivity and mental anxiety act as an anti-utility agent (reduces utility) and reduces the amount of increase in desirability due to increased energy consumption. It can also be explained on the curvature of indifference in Diagram. 3. Thus, in the equilibrium point E_0, which relates to the consumption of energy commodity before applying the relevant non-pricing policy (X_0), the slope of the indifference curve $\frac{MU_x}{MU_y}$, is equal to the gradient of the budget ($\frac{P_x}{P_y}$). But by applying cultural policy, because of changing consumer energy preferences (δ), the utility function, and hence its equal utility curve originally changed (change from U_0 to U_2 in the figure), and for the corresponding previous values of energy consumption (including energy consumption X_0 in the initial state), will make it less (final) utility; therefore, the consumer's new indifference curve in the amount of energy consumed corresponding to the initial balance (X_0), due to the reduction in its final utility (MU_{X_0}), and consequently reduce the amount of deductions ($\frac{MU_x}{MU_y}$) at this point, will be slower than the budget ($\frac{P_x}{P_y} > \frac{MU_x}{MU_y}$). Since, according to the definition of consumption theory, as the value of X increases, the slope of the indifference curve decreases, for the slope of this curve has been increased and re-equalized with the gradient of the budget constraint, and by converting the above inequality into equal, the required balance of consumption is restored, the amount of energy consumed (X) should be lower than the initial state in this case (Henderson & Quandt, 1985), (Mas-Collel & Whinston, 1995), (Varian, 1993). Therefore, the new indifference curve is located at a point such as (E_2) that lies on the left of the

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initial equilibrium (E_0) links the budget constraint, and at this point, consumer's new subjective value ($\frac{MU_x}{MU_y}$) will be equal in new situation, with the fit of prices of X and Y (which remains unchanged).

Briefly, the analysis of pricing policies and non-price policies (such as socio-cultural policies) and their impact on consumer balances in the theory of consumer behavior are significantly different with each other that the curvature of indifference was constant in the analysis of the price policies impact, and changes in the budget constraint explain the changes in the consumer balance point (Change from E_0 to E_1 in the diagram3), but it is on the contrary in non-price policies such as cultural policy as these changes are the curve of desirability and indifference that describes and determines the changes in the consumer's balance of consumption (Change from E_0 to E_2 in the diagram3).

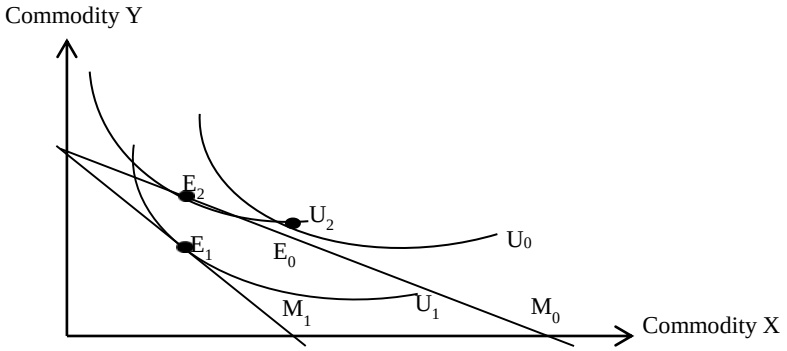


Diagram3. A comparison of the impact of social-cultural policies with price-policies within the theory of consumer behavior
Reference: (Mas-Collel & Whinston, 1995)

However, it is possible to examine the implications of consumer welfare changes in both the application of pricing policies and cultural ones in diagram3. In short, given the policy of rising prices aiming to optimize energy consumption, it can be said that firstly, it has a lot of welfare and economic costs to the community, secondly, the realization and effects of the works and the results are time-consuming, and thirdly, as mentioned before, it does not have much to do in societies with low demand toward price (such as the Iran); its influence is so slight. Certainly, non-price policies, in particular intelligent social-cultural policies, have more efficiency and chance, and they are of particular importance.

Theoretical Model

In this research, based on the results of library and field studies and with regard to the specific characteristics of the urban community in the field of consumer and energy behavior issues, the components and elements of the proposed model are designed as Table 1.

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Table1. Components and elements of the proposed model

Dependent variable Y	Latent variable Xi	The observed variables (apparent) X_{ij}
Energy consumption behavior in urban community	Price Economic Policy (X_1)	Reforming and liberalizing the price of energy carriers by eliminating overt and covert subsidies (X_{11})
		Energy Taxation (X_{12})
		Stage Energy Tariffs (Pricing to Consumption Level) (X_{13})
		Development of tax incentives and reduction of government dues for low-income households (X_{14})
	Non-Price Economic Policy (X_2)	The supply of high performance and low-energy products (such as low-energy bulbs) at affordable prices, especially for low-income households (X_{21})
		Supporting the improvement of the business environment in the field of activities and businesses related to the category of energy efficiency and technologies and related techniques (X_{22})
		Strengthening the targeted subsidy plan aimed at reforming the distribution pattern of the society (eliminating the subsidy of high-income sectors) (X_{23})
	Religious, and Moral Beliefs and Values (X_3)	More information on the fatawa of the imitating authorities in respect to the sanctity of waste and excessive consumption, and more importantly, the guarantor of the energy surgeon (X_{31})
		Developing the ethical foundations of the community that prohibit consumerism, the luxury of welfare and the promotion of simplicity (X_{32})
		Extending Qur'anic concepts in the field of emphasis on charity, the prohibition of extravagance and attachment (X_{33})
		Culture, promotion of the culture of saving and optimizing consumption in religious gatherings, and the precise explanation of the link between optimal use and religious and religious beliefs (X_{34})
	National and social beliefs and norms (X_4)	Observing consumption savings in organizations and government agencies (X_{41})
		Culture in the context of weakening the use of guerrilla, demonstration, and demonstration (aiming at showing others) and the use of a ghostly eye (which is comparable to others and attempts to stay away from them) (X_{42})
		Encouraging reference groups and social patterns (such as artists, athletes, professors and faces) on cost-effective behavior (X_{43})
		An attempt to design and promote a sample of household energy consumption pattern (X_{44})
		Increasing social capital and building trust between the people and the government in order to reduce the sense of opposition and political opposition as a psychological factor and protest behavior in prudent behavior (X_{45})
		Guiding and directing social fashion to expand the modes of optimal consumption (X_{46})
		Supporting the production of films, serials and promotional programs as a means of guiding household consumption behavior, and preventing non-promotional consumption inducing commercials (X_{47})
		Officials' simple life and avoiding them from lavishness (X_{48})
		Promotion of energy efficiency optimization methods through the implementation of systems and the use of equipment for optimizing consumption in public places (mosques, husseiniyahs, urban public places ...) (X_{49})

Reference: (Researchers' Findings)

In Table 1, variables (X1) and (X2) represent economic components and variables (X3) and (X4) represent cultural-social components in the analysis of energy consumption behavior in urban society. It should be noted that our approach in this research to the category of culture and socio-cultural components is based on the internal social resources that affect consumer behavior. According to Jin's definition, institutions, beliefs, religions, attitudes and attitudes toward values, ethics, utility, or degree of social eagerness, human feelings and emotions are part of internal social resources while various social societies, associations, nonprofit organizations, NGOs, as well as human-social connections, are external social resources (Jin, 2011).

However, in order to measure the total dependent variable, i.e., the efficiency of energy consumption

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behavior in the urban community, three questions (obvious terms) are raised:

1- How much energy is consumed in urban society from its optimal position? (Y_1)

2- How far is the consumption culture of urban households away from the culture of optimal energy consumption behavior? (Y_2)

3- To what extent are equipment and consumables for energy and buildings compatible with the principles of optimal energy consumption? (Y_3)

Regarding the contents of Table 1, and also the important point that the beliefs and religious and moral values common in a society affect the attitudes and norms governing it, one can consider the conceptual model of Figure 1 for the relationship between hidden variables.

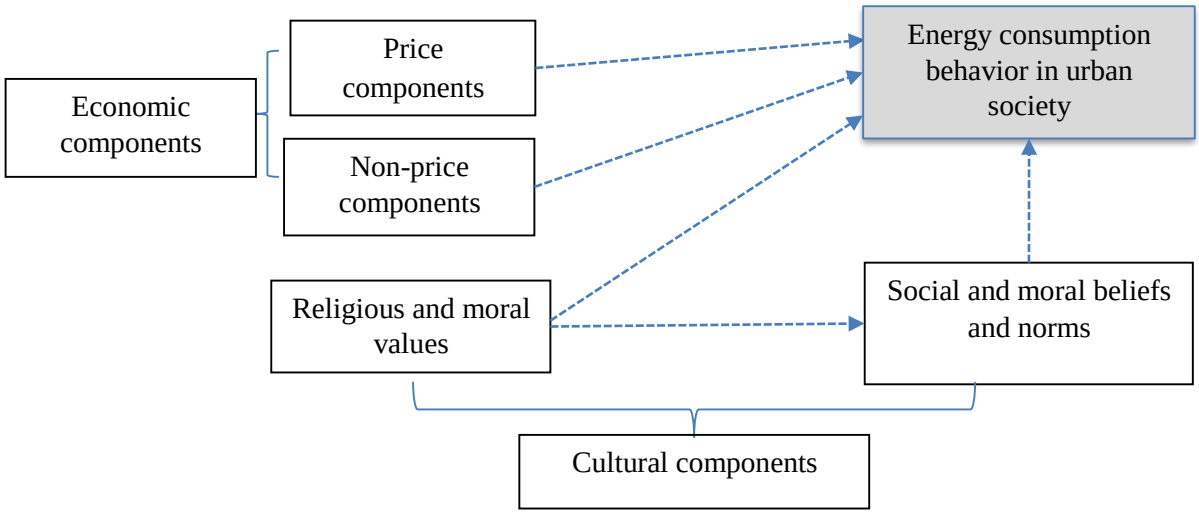


Fig.1. Conceptual model

Reference: (Researchers' findings)

4- Research Method

The method of this study is survey and for analyzing quantitative data, Structural Equation Modeling (SEM) has been used. In this regard, firstly, according to the observed and latent model variables, as a questionnaire consisting of five sections (the number of variables as well as the dependent variable of the model), and a total of 23 questions were designed and how to score each question (variable) was defined based on 5-point Likert scale.

Cronbach's alpha method was used to examine the reliability of the questions. For this purpose, using the SPSS software, the amount of statistics for each of the five sections of the questionnaire was obtained as Table 2.

Table2. The amount of statistics obtained to measure the reliability of each of the latent variables

Latent variables	Price policies	Non-price policies	Urban consumption energy behavior	Religious and moral beliefs	National and social beliefs
Cronbach's alpha	0.923	0.889	0.834	0.813	0.898

Reference: (Researchers' findings)

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If the Cronbach's alpha coefficient is more than 0.7, the reliability of the questionnaire is evaluated as desirable (Habibi, 2016). Therefore, with regard to the values obtained for each of the latent variables in Table 2, we can conclude that the questions (s) designed to evaluate each of the variables are of high reliability. According to many researchers, the minimum sample size is 200 (Garver & Mentzer, 1999), (Sivo et al., 2006) (Hoe, 2008). Since the methodology for structural equation modeling is largely similar to some aspects of multiple regression, we can use the principles of sample size in multivariable regression analysis to determine the sample size in structural equation modeling (Hooman, 2014). According to Hiro et al. (1995), in the analysis of multivariable regression, the ratio of the number of samples (observations) to independent variables should not be less than five; otherwise, the results obtained from the regression equation will not be as generalizable. The more conservative ratio of 10 observations per independent variable was proposed by Halinsli & Feldt (1970) and Miller & Kunce (1973). According to James Stevens, even considering 15 observations per predictor variable in multiple regression analysis with the standard method of least standard squares, is a good rule of thumb. Therefore, in the methodology of structural equation modeling, the sample size can be determined from 5 to 15 observations per measured variable:

$5q \leq n \leq 15q$

Where q is the number of variables observed or the number of questionnaires (questions) and n is the sample size (Hooman, 2014).

However, Kline (2010) believes that in exploratory factor analysis for each variable, 10 to 20 samples are required, but at least the sample size of 200 is defensible. Nevertheless, in the confirmatory factor analysis, the minimum sample size is determined by the factors rather than the variables. If structural equation modeling is used, about 20 samples are required for each factor (latent variable) (Jackson, 2003). According to the stated content, the sample size of 249 that is considered for evaluating the relevant theoretical model in this research is scientifically defensible, adequate and desirable. The statistical population of this study is to collect the necessary information from the professors and Ph.D. students in economics and energy that can comment on this.

5- Research Findings

The Kolmogorov–Smirnov test is used to check the normality of the data. If the test statistic (sig) is greater than or equal to 5%, with high confidence it can be said that the distribution of data is normal. The output of this test in SPSS software is given in Table 3:

Table3. The results of Kolmogorov–Smirnov test

	Price policies	Non-price policies	Religious and ethical beliefs	National and social beliefs	Efficiency
Sample size	249	249	249	249	249
Min value	1.75	1	2.5	3.44	2
Max value	5	4.67	5	4.89	5
Mean	3.38	2.73	3.73	4.13	3.63
S.D.	0.865	0.896	0.688	0.392	0.717
Sig.	0.263	0.123	0.056	0.069	0.054

Reference: (Researchers' findings)

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As you can see, the sig value for the five factors in the structural model is greater than the critical value, so that the distribution of each of them is normal. Prior to fitting the model, the Confirmatory Factor Analysis (CFA) has been used. This analysis shows whether the designed scale (questionnaire) is valid for data collection. In fact, confirmatory factor analysis is a method for calculating structural validity. Therefore, using a confirmatory factor analysis, the overall structure of the research questionnaires has been subject to content validity (Habibi, 2012). In fact, the structural equation modeling has two parts: First, factor analysis, confirmatory and not exploratory (because through it, agents are verified, not exploration), then multiple regression or path analysis (Mas'udi, 2012), through which the general relations between agents or structures (variables), are evaluated and tested the hypothesis. In fact, until it is not proved that indicators or the questions of the questionnaire have measured the latent variables well, the relationships cannot be tested (Habibi, 2012); therefore, in the present study, to confirm that the concepts have been well measured, as well as to test the relationships between terms (obvious variables) and factors (latent variables), the confirmatory factor analysis or the measurement model was used. After the preliminary estimation of the confirmatory factor analysis using LISREL software, the t-statistic (which shows the significance of observed correlations at a 5% error rate) is calculated by calculating the t-value for factor loads and error sentences or estimation error (unreleased variance) of each variables calculated, and then the model is saturated to improve the evaluation indicators of the model, including two important indicators of RMSEA and Chi-square normal. Finally, the output of Diagram 4 can be achieved for the confirmatory factor analysis in the t-value statistics calculation mode:

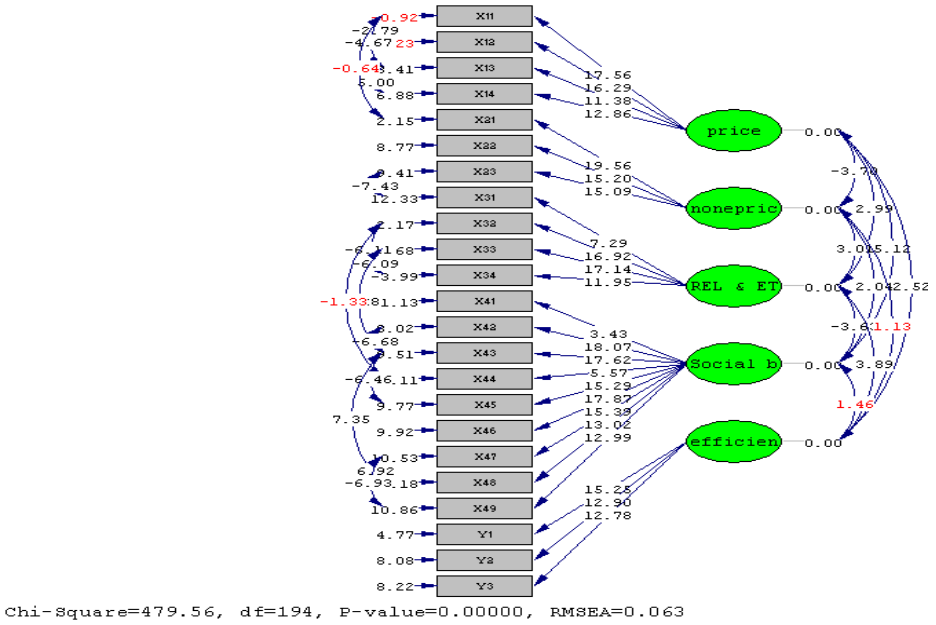


Diagram4. Factor loads of t-value statistics in confirmatory factor analysis

Reference: (Researchers' findings)

Since the significance is checked at the error level of 0.05, so if the observed factor load is calculated using t-test or t-value less than 1.96, then the relationship

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is not significant. Therefore, based on the output of the LISREL software for confirmatory factor analysis, all factor loads representing the correlation between the latent variable and the obvious variables are significant, and the terms defined for each factor define the related structure well and this model has a desirable value for the structures. In addition, the important indicators of RMSEA and the normal Chi-square that are relevant to the evaluation of the relevant model represent a desirable and acceptable level because the RMSEA index is less than 0.1 and the normal x-value index obtained from the chi-square distribution over *df* is in the range of 1 and 5 and equals 2.47. There are also other indicators for modeling the fitting of the model, including the ones mentioned below, which are related to the obtained output of the above factor analysis, and each of them has received the desired amount:

Normed Fit Index (NFI) = 0.96
Non-Normed Fit Index (NNFI) = 0.92
Parsimony Normed Fit Index (PNFI) = 0.73
Comparative Fit Index (CFI) = 0.91
Incremental Fit Index (IFI) = 0.91
Relative Fit Index (RFI) = 0.94

In general, the fitting indexes of the model indicate that the model is suitable for confirmatory factor analysis and, based on the values obtained for the factor loads, the impact and significance of each of the observed variables on the corresponding structure in comparison to each other can be analyzed and examined. However, since the main evaluation of factor loads should be performed along with the evaluation of the causal relations coefficients between the latent variables (structures) that are involved in the modeling of structural equations, the analysis of the importance and priority of the items related to each of the economic and socio-cultural components has been assigned to that sector. The conceptual model for latent variables in the present study was evaluated and tested using the structural equation modeling technique in LISREL and the output of diagram 5 for factor loadings (for relations between explicit and latent variables) and the coefficients of causal relationships between hidden variables with each other in the mode of estimation standard were obtained.

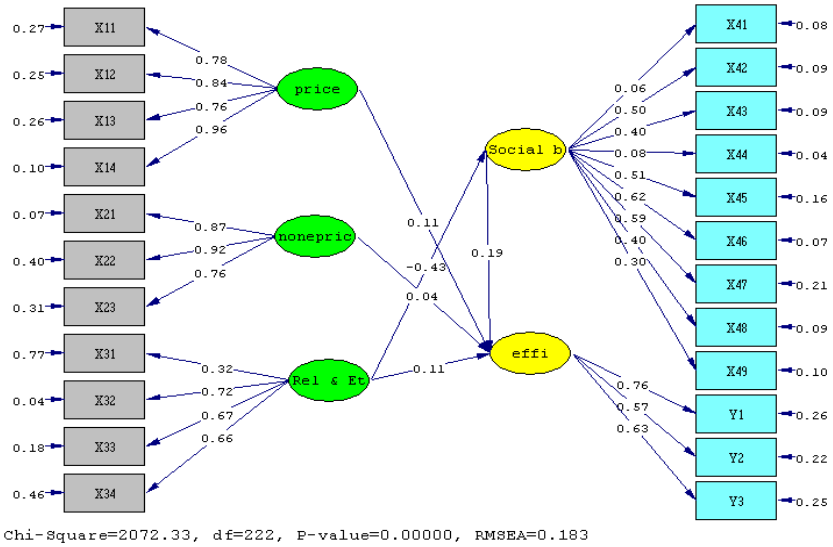


Diagram 5. Factor loads and causal relations coefficients of standardization of structural equation modeling

Reference: (Researchers' findings)

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Now, by calculating the t-value for the above model, the significance of factor loads and causal relationships were investigated; then, by the saturation of the model and the connection of the error sentences and non-uncertain variances (which are visible in the path-out modeling of the LISREL structural equation modeling), lead to the correct assignment of common errors between particular clauses to the unmatched variables in the model and to improve the fitting indices of the model and increasing the accuracy of the model, the output of diagram 6 was obtained for the corresponding model:

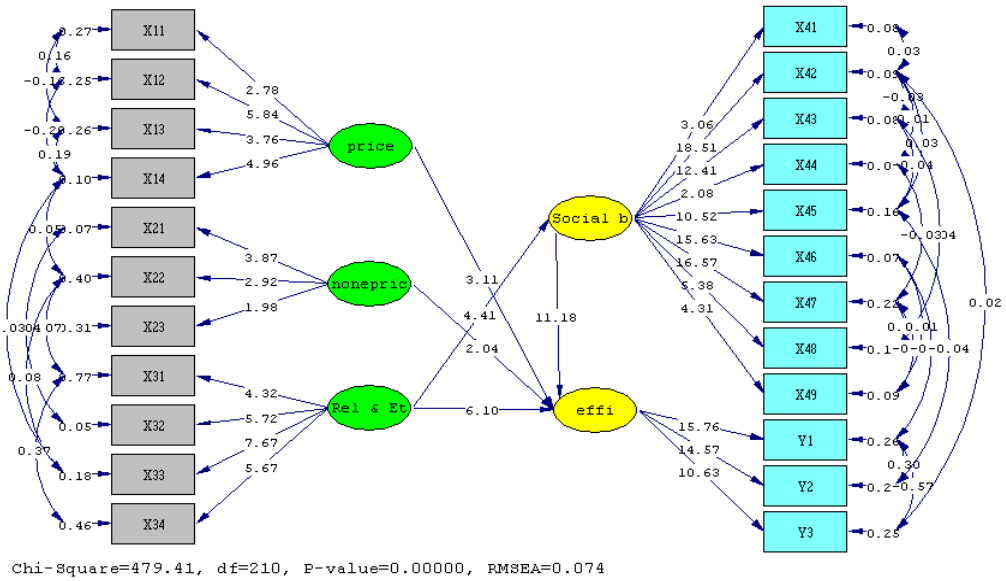


Diagram 6. Calculations of t-value of factor loads and causal relations coefficients in the saturated model

Reference: (Researchers' findings)

As in the final output of the Structural Equation Modeling in LISREL, the coefficients of the causal relations of the assumed theoretical model are significant (greater than 1.96) and, on the other hand, the RMSEA index as well as the normal Chi-square index, which is shown at the bottom of Diagram.6, displays the good values and indicates a good fit for the model since the RMSEA index is 0.07, which is less than 0.1 and less than 0.08. On the other hand, the normal xi-2 index obtained from the chi-square distribution on df shown in the figure above is 2.28 which is in the range of 1 and 5 and; therefore, it is desirable. In addition, there are other indicators of the output of the path-out seen in LISREL, some of which are given below, each showing a decent amount.

Normed Fit Index (NFI) = 0.97
Non-Normed Fit Index (NNFI) = 0.93
Parsimony Normed Fit Index (PNFI) = 0.79
Comparative Fit Index (CFI) = 0.91
Incremental Fit Index (IFI) = 0.95
Relative Fit Index (RFI) = 0.93

Based on the results obtained from the structural equation modeling in LISREL, the following points can be considered in relation to the model's factors and structures (latent variables):

1. Among economic factors, pricing policies have more impact than non-price

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ones on consumer behavior in urban society; but, overall, the impact of economic policies on improving energy efficiency in urban society is considered weak and not significant.

2. Among the socio-cultural factors, the influence of religious and moral values on social and national norms in our society is significant and shows that the role of religious principles and beliefs is high on social attitudes and beliefs. Although the components of religion and ethics have less direct impact on the urban energy consumption behavior than the social and national factors, considering its direct and indirect effects, it can be considered as one of the important factors influencing consumer attitudes in urban society. However, social beliefs and norms (which combine various components, including religious and moral values) have a significant role in the energy consumption pattern of the urban household.

3. In general, socio-cultural components play a major role in shaping and directing the pattern of energy consumption behavior in urban society, and although the impact of economic components is known at a level of 5% error, based on standardized coefficients estimated for causal relationships of economic components, since the value of this estimate in the standard state is less than 0.3, these relations are weak and can be ignored. In the meanwhile, the standard coefficients of the causal relationship between the structure of religion and ethics show a value between 0.3 and 0.6, which indicates an acceptable relationship between this factor and the dependent variable. Finally, the standard coefficient of causality related to the structure of socio-national beliefs is more than 0.6, indicating a very favorable relationship between this factor and the dependent variable of the model.

In addition, in relation to the importance and priority of the indicators defined for each of the economic and cultural factors in the model, the following inferences can be made:

1. In relation to cost-effective economic policies, the tax on energy consumption has the greatest impact on the energy consumption behavior of the urban community and modification and liberation of the price of energy carriers has the least impact. Developing tax incentives and reducing government dues for low-income households ranked the second. Setting energy tariffs for energy carriers and pricing in line with consumption levels ranked in the third place, indicating the mere liberalization of the price of energy carriers is not the optimal policy for stimulating consumers to modify their behavior towards the correct use of energy carriers.

2. Among non-price economic policies, the supply of high-performance and low-cost products with reasonable prices, especially for low-income households, has a significant relationship with the related structure, but supporting the improvement of the business environment and technologies and techniques related to the energy efficiency category has a weaker relationship with energy consumption efficiency, and strengthening the targeted subsidy plan aims to modify the pattern of income distribution in society has little impact and it is negligible.

3. Among the indices related to the component of religion and ethics, the expansion of Qur'anic concepts in the field of emphasis on charity, the prohibition of extravagance and attachment, has a significant effect, and then, the expansion

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of the community's ethical foundations of the prohibition of consumerism, luxury and well-being, as well as the promotion of simplicity and the culture of saving, the optimization of consumption in religious and religious gatherings, and the precise explanation of the link between the optimal use and religious beliefs have less impact than the previous index and are relatively equal to each other. Finally, more information on the fatawa of imitation sources regarding the sanctity of waste and excessive consumption has less impact than other indicators related to this structure.

4. In relation to the structure of social and national norms, cultural indices in the context of weakening the use of taking pride, presentations and demonstrations, supporting the production of films, serials and promotional programs as a means of guiding household consumption behavior as well as preventing commercial advertisement inducing inappropriate consumption, and directing social fashion in order to expand the modes based on optimal consumption have very good relationships with the relevant factor respectively. Subsequently, the indices of encouraging reference groups, social patterns, and figures to saving behavior, increasing social capital and building trust between the people and the government in order to reduce the sense of opposition and political opposition as a psychological factor and protest behavior have a favorable relationship respectively. Thereupon, authorities' simplicity of life, avoiding lavishness and promoting the methods of energy efficiency optimization by implementing systems and using equipment for optimizing consumption in public places at a lower level had significant relationship with this factor. Finally, observing consumption savings in governmental organizations and institutions, and efforts to design and promote a sample of energy consuming households have a weak relationship with the socio-national norms and they are negligible.

5. However, the factor loads associated with the indicators related to the dependent variable or the total structure indicate that the overall energy consumption in the urban community has a large distance to its optimal state. The main reason for this undesirable approach to urban household consumption behavior is related to the factors related to the ideas and their culture of consumption and it shows that improper and non-optimal consumption of energy in urban households in Iran has more socio-cultural origin than economic. However, misguided economic policies and pricing of energy carriers can aggravate and foster a misleading culture of consumption in the urban community.

6- Conclusion and Discussion

The present research approach to the consumption pattern, in contrast to consumer theories in economics, is a sociological approach to consumer patterns. The reason for adopting this method is the flaws that purely economic approach uses to explain and predict theoretically, since they disregard the roots of consumption and its constituent elements and practically, changing in the pattern of consumption with economic policies, the success of such policies has become problematic.

Considering the importance of the issue of energy consumption, especially in the urban community, which accounts for over 70% of the country's population, in this research, we tried to analyze the phenomenon of energy consumption behavior in urban society with an economic-

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social approach. By using expert data opinion in this area as well as the technique of structural equation modeling in LISREL, it has been tried to conduct an accurate and scientific analysis in this field. Based on the results obtained from the model, economic policies (both price and non-price ones) have no significant effect on the improvement of energy consumption behavior in urban society and there is a weak relationship between these components and energy consumption behavior in cities. However, the most important factors identified for these categories of components are:

- Taxation of energy consumption (after the release of energy carriers)
- Developing tax incentives and reducing government dues for low-income households
- The supply of high quality and low-cost products, especially for low-income households

On the contrary, social and national beliefs and norms have a significant impact on consumer behavior and currently, they are the main source of formation and direction of energy consumption patterns in the urban communities of Iran. Among the various factors affecting it, the following were identified as the most effective current factors on consumer behavior in urban society:

1. Culture-building in the context of weakening the use of perfidy, demonstration consumption (with the purpose of showing others and attracting attentions)

2. Supporting the production of films, serials and promotional programs as a means of guiding household consumption behavior as well as preventing inappropriate commercials inducing non-optimal consumption

3. Guiding and directing social fashion toward expanding modes based on optimal consumption

4. Encourage reference groups and social patterns (such as artists, athletes, faculty members, and prominent figures) to be economical

5. Increasing social capital and building trust between the people and the government in order to reduce the sense of opposition and political opposition as a psychological factor and protest behavior against wasteful behavior

However, the potential impact of religious and moral values on social and national beliefs and norms was proved. Considering the direct effect that was observed for these socio-cultural components on energy consumption behavior in urban society, high capacity for religious-ethical attitudes and values in order to improve consumer behavior in urban society can be regarded, especially through the following:

- Expansion of Qur'anic concepts in the field of emphasis on charity, the prohibition of extravagance and wastefulness
- Expanding the ethical foundations of the community to prohibit consumerism, luxury, and the promotion of simplicity
- Creating culture and promoting the culture of saving and optimizing consumption in religious gatherings and a clear explanation of the link between optimal use and religious beliefs

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