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Institutional Mechanism of Engineering *Istisna* and its Prospects for Saudi Arabia

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ABSTRACT. The article raises the problem of neo-industrial diversification of Saudi Arabia using the institutional mechanism of engineering *istisna*. The article shows that Saudi Arabia has all the objective and subjective conditions for the successful creation of a neo-industrial model of the information society in the process of the fourth industrial revolution. A balanced institutional approach is used to analyze this problem, which assumes the unity and interrelation of institutional and technological changes in the process of neo-industrial diversification in Saudi Arabia. The authors conclude that the institute of engineering *istisna* will allow Saudi Arabia to organize the creation of "smart", automated neo-industrial enterprises by orders of private investors. Thanks to this institutional mechanism, Saudi Arabia in the historical perspective can become the world leader in the controlled process of the fourth industrial revolution, just as England became the leader of the spontaneous process of the first industrial revolution more than two hundred years ago.

Keywords: engineering *istisna*, Islamic economy, Saudi Arabia, fourth industrial revolution, neo-industrial diversification, information society, national technostructure, automated production, customization.

JEL CLASSIFICATION: E60, F50

KAUJIE CLASSIFICATION: G61, K10

1. Introduction

According to *Shariah*, for the sale of goods it is necessary that the goods intended for sale be in the physical or real possession of the seller. This condition has three components. First, the product must actually exist: what does not exist at the time of sale cannot be sold. Secondly, the seller must be the owner of this product. If a product actually exists, but the seller does not own it, he cannot sell it to anyone. Third, mere ownership is not enough. The goods must be in the physical or actual possession of the seller (Siddiqi, 2005).

However, there are exceptions to this general principle in *Shariah*. One of them is *istisna*, which means ordering a manufacturer to produce a specific product for a customer. If a manufacturer undertakes to manufacture goods to order from his own or purchased materials, then an *istisna* transaction arises. To enter into an *istisna* contract, the parties must determine the price and necessary specifications of the goods being produced.

The literature rightfully focuses on the institutional form of *istisna* (Adam, Napiah, & Ibrahim, 2016; Anisza, & Mohamad, 2019; Hafiz, & Buang, 2014). However, it is necessary to fully take into account the dual nature of economic institutions in general and the institution of *istisna* in particular. Their duality is associated with the unity of the institutional form and technological content of economic institutions.

First of all, attention is drawn to the amazing correspondence of the institution of *istisna* to the trends of the fourth industrial revolution, which gives rise to a new technological way of connecting production and consumption, based on individual orders (Li, Sun, Tong, Mustafee, & Koh, 2024). According to many researchers, modern consumers no longer need mass products, they want products that meet their specific, personal requirements (Deng, Sierla, Sun, & Vyatkin, 2023; Wang, Yuan, Luo, Liu, & Yannopoulou, 2023). If production is close to the point of sale, then making the necessary changes becomes much easier. In the fourth industrial revolution, work has been automated to such an extent that labor costs can be largely ignored and the benefits of mass production become less important. Therefore, an individualized way of connecting production with consumption, which involves customization and customerization, inevitably gives rise to a tendency for production to be geographically closer to the consumer. If global value chains are focused primarily on the development, production and promotion of standard consumer goods, then such technological customization and customerization, on the contrary, open up new opportunities for the localization of industrial production in rich countries, whose population is materially and mentally most ready to consume goods based on individual orders. Container shipping is essentially a continuation of mass-flow and large-scale production in the process of circulation. Therefore, products created according to individual orders are more difficult to pack into containers intended for the transportation of mass standard goods. This contributes to the localization of the "digital" production of the fourth industrial revolution and bringing them closer to consumers.

The fourth industrial revolution connects the two worlds of material production and virtual networks through the use of cyber-physical production systems (CPPS). Cyber-physical systems mean the integration of computation into physical processes. Embedded computers and networks monitor and control physical processes, and this is usually accompanied by feedback loops. Due to this close mutual connection, including feedback, physical processes and computation actually act as a unity and together form cyber-physical systems. Such systems synthesize the virtual and physical worlds in a single networked world, in which "smart" things directly and freely communicate and interact with each other. This can lead to factories that operate like a single complex machine. In this case, individual automated devices actually become

parts of a single fully automated production process, self-regulating and self-adjusting with little or no human intervention. Cyber-physical production systems, including sensors, actuators and machines, are connected in real time into a single network with the same fully automated business process that controls the flow of raw materials, materials, logistics, marketing, distribution and consumption.

In addition, connecting such iFactories (intelligent factories) to computer design programs will allow the production process to change as new products and technologies appear. This means that almost complete automation of the process of functioning of industrial production can be combined with partial automation of the process of its technological development in the conditions of the fourth industrial revolution. In other words, the purely human innovative function of entrepreneurship in the context of the fourth industrial revolution is, in principle, also amenable to some degree of partial automation. The literature notes the change in the paradigm of industrial production that is taking place in the process of "digitalization" compared to the traditional Fordist model of mass production of strictly standardized consumer goods, which at one time opened the way for the Western "high-consumption society" and radically changed people's lifestyle. This radically changes not only the logic of the production process, but also the technological way of interconnecting production and consumption. For example, as regards after-sales service, it is no longer limited to the fact that service departments simply support the process of using a technically complex industrial product. The product itself now acquires the ability to communicate not only with service centers, but also directly with the machines that participated in its creation, and to give them decentralized commands along the entire chain based on intermachine interaction. Thus, at present, the global industry is on the threshold of the fourth technological revolution. In the long term, in terms of its scale, depth and complexity, this technological transformation may turn out to be completely unlike anything humanity has ever experienced before, and it is still unknown how it will unfold in the future (Schwab, 2017).

One of the most important economic features of the fourth industrial revolution is that it objectively requires active support from the state. This is explained, first of all, by the high capital intensity of automated production. objectively requiring large investments in fixed capital. Perhaps this is why the world leader in robotization of production is not the United States, but South Korea. Largely due to active support from the state, South Korea has achieved the highest level of industrial robotization in the world today (Kim, 2024). At the same time, the United States has a relatively low level of production robotization due to the lack of an active state industrial policy. The absence of such a sufficiently active industrial policy in many Western countries is holding back the deployment of the fourth industrial revolution in them. This largely explains the paradoxical historical fact that the fourth industrial revolution is usually not accompanied by an acceleration of growth in production and productivity in Western countries. On the contrary, the fourth industrial revolution paradoxically corresponds to the so-called "new normal", which means a tendency towards relatively low growth rates in the Western economy and the world economy as a whole.

Inspired by the innovative achievements of the fourth industrial revolution, the literature usually focuses on its technological side, but much less attention is paid to the institutional problems and analysis of these new economic forms and institutional mechanisms necessary for the further full-scale deployment of the fourth industrial revolution. This article attempts to overcome this one-sidedness and focus on finding adequate institutional forms for using the achievements of the fourth industrial revolution in the process of further diversification of production in Saudi Arabia.

This article examines the potential for interaction between the technological achievements of the fourth industrial revolution and the traditional Islamic economic institution of *istisna* in the process of further diversification of the Saudi Arabian economy. At the same time, the ability of *istisna* to save transaction costs is taken into account, thereby opening up the possibility of a new type of investment transactions that meet the needs of further diversification of the Saudi Arabian economy based on the achievements of the fourth industrial revolution.

As a methodological basis for the analysis, a version of the institutional approach is used that seeks to overcome the one-sided nature of, on the one hand, classical institutionalism, and, on the other hand, neoinstitutional direction. It is taken into account that, if classical American institutionalism is based on the methodology of technological determinism (Galbraith, (1967) 2007; Hodgson, 1988; Rutherford, 2001; Schmidt, 1978), then neoinstitutionalism, on the contrary, proceeds from a kind of institutional determinism (Furubotn, & Richter, 2005; Coase, 1998; North, 1992; North, 1995; Keefer, & Knack, 2005; Eggertsson, 2005). In methodological terms, the article seeks to overcome the extremes of these two opposing institutional approaches based on an analysis of the relationship between institutional and technological changes in the process of neoindustrial diversification of the economy in Saudi Arabia.

2. Historical Perspectives of Neo-Industrial Diversification in Saudi Arabia

The fourth industrial revolution requires a new look at the information society. In the literature, an information society is generally considered to be a society in which the majority of workers are engaged in the production, storage, processing and practical use of information. At the same time, it has become generally accepted in the literature to actually identify the information society with the post-industrial one. As Daniel Bell has stated, “a revolution in the organization and processing of information and knowledge, in which the computer plays a central role, is developing in the context of what I have called post-industrial society” (Bell, 1989, p.57). William Martin and many other authors also understand information as a “developed post-industrial society” (Martin, 1995, p.117)

But with the beginning of the fourth industrial revolution, the historical situation began to change radically, calling into question the legitimacy of the categorical identification of information and post-industrial society. As the fourth industrial revolution unfolds, the historical movement towards a new model of the information society, which is based on a fundamentally new “digital” industrial basis, is becoming increasingly obvious. Such an information society of the neo-industrial type, or, what is the same, the neo-industrial model of the information society, is replacing its “old” post-industrial model. This post-industrial model was dominant before the fourth industrial revolution and continues to be dominant today, since today the fundamental neo-industrial transformation of production is only just beginning to unfold. (Zhu, Qiao, & Cao, 2017; Xu, & Chen, 2017; Rauch, Dallasega, & Matt, 2018; Shim, Park, & Choi, 2018).

Conceptually, these fundamental historical shifts require a new categorical path and a combination of the concept of the information society with the consideration of the fourth industrial revolution as a neo-industrial transformation of production. At the same time, it is important to fully take into account that, in the historical perspective, such a neo-industrial transformation creates an adequate production base for a new, higher historical stage of the information society. Such a categorical synthesis is a reflection of a real transformation process leading to a society that is both informational and neo-industrial, namely informational in terms of employment and neo-industrial in its production basis. This neo-industrial model of the information society

means a more mature historical stage of development of the information society, based on an adequate production fundament in the form of comprehensively automated production. At an earlier, post-industrial stage of its development, the information society did not yet have and, it must be said, does not have such a neo-industrial production base. It was satisfied mainly with the production base that it inherited from the industrial stage of development and therefore was not yet adequate to the internal nature of the information society.

If the earlier, post-industrial stage of development of the information society is characterized by a tendency towards globalization of the economy, then the process of neo-industrial transformation, on the contrary, is more consistent with the tendency towards localization or, as they also say, fragmentation of production. This trend means that vertical value chains operating under the auspices of transnational corporations are beginning to gradually lose their global character and move inside nation states and thereby localize.

At the same time, another, no less important difference is revealed, related to the characteristics of the neo-industrial transformation of production. If the post-industrial transformation of the Western economy and the transition to an information society occurred spontaneously, then the transition to a neo-industrial model objectively requires conscious management by the state (Agarwal, & Brem, 2022; Chui, Manyika, & Miremadi, 2021). The post-industrial model formed itself, spontaneously, without much effort on the part of the state, and the neo-industrial model of the information society, on the contrary, must be consciously created. Modern Western experience shows that spontaneously this transformation process occurs too slowly. This is clearly manifested in the so-called “new normal,” which is characterized by low rates of economic growth and, above all, industrial growth in Western countries. In fact, this so-called "new normal" is by no means normal for the modern economy. In fact, this so-called “new normal” is by no means normal for the modern economy. It indicates, on the one hand, the inadequacy of the spontaneous method of implementing the “digital” transformation of production and, on the other hand, the need to transition to a new model – a model of controlled neo-industrial transformation(Valencia, Lamouri, Pellerin, & Dubois; Grieco, 2017; Erol, & Sihn, 2017).

In contrast to spontaneous development, controlled neo-industrial transformation objectively requires a new type of leadership that requires strong political will. And again, just like a hundred years ago, strong political leaders can come to the forefront of history. Therefore, it cannot be ruled out that in the process of neo-industrial transformation, historical initiative may move from Western countries to the oil-producing countries of the Middle East and, above all, to Saudi Arabia. And the point is not only that the Saudi Arabia has enough money to acquire “smart” neo-industrial enterprises in the West that are capable of operating in automatic mode. Much more important is that Saudi Arabia has a powerful subjective development factor – the young and energetic Crown Prince *Mohamed bin Salman al Saud*. At the same time, the institutional form of an absolute monarchy itself is most suitable for the economic implementation of strong political will in the process of controlled neo-industrial diversification of production. Thus, in Saudi Arabia we see such an absolute coincidence of subjective and objective conditions for successful neo-industrial transformation, unique for the modern world, which makes us recall Hegel’s concept of identical subject-object, meaning complete unity or identity of subjective and objective factors of the historical process.

If the United Arab Emirates and, above all, Dubai, are very successfully creating an information society of a post-industrial type,

then Saudi Arabia has all the objective and subjective conditions to create a neo-industrial model of an information society with no less success. This model signifies a higher stage of historical development of the information society than the post-industrial model of the American type. Initially, it is based on a neo-industrial foundation in the form of complex automated production, whereas at an earlier, post-industrial stage of development, the information society did not yet have such an adequate foundation. Since modern Saudi Arabia has all the necessary and sufficient conditions for a fundamental neo-industrial transformation, this new historical stage can be called the Saudi development model, which means a higher level of historical development of the information society than the post-industrial model of the American type.

It is not surprising, then, that many experts, including JPMorgan Chief Executive Officer, Vishwas Raghavan, are now predicting an economic boom for the Middle East. At the same time, Bloomberg indicates that in the near future, the most advantageous positions in the Middle East will be enjoyed by Saudi Arabia, the United Arab Emirates (UAE) and Qatar. These countries will attract the attention of top managers and investment funds from around the world. According to Raghavan, this scenario will remain relevant in the region for a long time. He said: "This is a golden era for companies in the Middle East and, in general, for the region. I think this is a long-term trend." He attributes the growing financial attractiveness of the region to the desire of local authorities to diversify economic models, reducing dependence on income generated by the oil and gas sector, and move to more technological industries. He notes that global geopolitical tensions are also helping to increase the flow of foreign investment and talent to the Middle East (Bloomberg News, 2023).

Saudi Arabia may well move to neo-industrial transformation, bypassing the stage of classical industrial society. As is known, the economic development of oil-producing countries along the classical industrial path can be hampered by the so-called “Dutch disease”, which increases the cost of their manufacturing products and makes them less competitive in the foreign and domestic markets. The basis of the “Dutch disease” is the high level of wages converted into dollars. Complexly mechanized industrial production requires a massive labor force. This may hinder its large-scale development in oil-producing countries due to the relatively high level of wages denominated in dollars due to the strengthening of the national currency. But, if production is as comprehensively automated as in “digital” enterprises of the fourth industrial revolution, then this inhibitive factor is reduced to a minimum and practically disappears. Thus, in the new historical era associated with the fourth industrial revolution, some oil-producing countries and, above all, Saudi Arabia, may well overcome the inhibitive effect of the “Dutch disease” on industrial development. This development is no longer just industrial, but neo-industrial development, which allows minimizing the impact of high wages associated with the relatively high exchange rate of the national currency of oil-producing countries.

In this regard, China has been known to take the exact opposite path, artificially depreciating the yuan to stimulate labour-intensive industrial exports (Higgins, 2020; Wang, & Zhang, 2022; Zhu, & Ge, 2021). However, the fourth industrial revolution opens up a completely different path of historical development for Saudi Arabia and other oil-producing countries in the Middle East. It is no longer associated with classical mechanized industrial production, but with automated neo-industrial enterprises, which mean a higher level of technological development of production. That is why neo-industrial diversification will make it possible to create a new model of the information society in Saudi Arabia, which may be called the Saudi model. Such a new information society of the Saudi type will differ from the

American model of the “old” post-industrial type, first of all, in its reliance on a neo-industrial production base in the form of fully automated enterprises corresponding to the technological achievements of the fourth industrial revolution.

Mechanized production in classical industrial enterprises corresponds to the automatic action of the spontaneous forces of market competition, which determine the development of not only the industrial, but historically the post-industrial economy that follows it. On the contrary, automated production is no longer adequate to the automatic action of spontaneous market forces, but to a completely different economic model – a model of controlled technological development. Therefore, the leaders in integrated production automation may well become those oil-producing countries that atone time did not become leaders in the development of mechanized industrial production. The fact is that the process of comprehensive automation of production in the conditions of the fourth industrial revolution opens up the possibility of systematically organized creation and development of the market for “digital” enterprises. An example of such a conscious use of market forces by the state can be, in particular, the institutional mechanism of engineering *istisna*, which is discussed in this article.

Thus, the fourth industrial revolution opens up a new way to overcome the inhibitive influence of the “Dutch disease.” Saudi Arabia and other oil-producing countries of the Middle East may well use it for the organized creation of capital-intensive neo-industrial production in comprehensively automated “digital” enterprises. It should be taken into account that the concept of the so-called “Dutch disease” gives a somewhat one-sided idea of the possible economic consequences of the relatively high exchange rate of the currencies of oil-producing countries. And the point is not only that these ideas, corresponding to the classical industrial stage of production development, may turn out to be largely outdated in the era of neo-industrial transformation. No less important is the fact that when considering the so-called “Dutch disease”, the advantages of a strong currency of oil-producing countries, which, on the contrary, can contribute to technological modernization and, especially, neo-industrial diversification of their production, are usually not fully taken into account. For example, due to the relatively high exchange rate of the real against the dollar, euro and yen, the equipment of “digital” enterprises purchased from Western countries becomes cheaper, and this makes its acquisition by Saudi Arabia more profitable. As for the products of these “digital” enterprises, a strong Saudi Riyal is not able to significantly increase their prices, since the share of wages in costs is small, and production costs consist mainly of costs for raw materials, materials, information products and depreciation of equipment. Because these resources are largely imported, the strong real makes them as cheap as automated plant equipment. Thus, the so-called “Dutch disease”, on the one hand, reduces the price competitiveness of non-oil products of classical industrial production, mainly due to increased labor costs. But, on the other hand, with regard to comprehensively automated production in practically unmanned “smart" enterprises, then in relation to it is not a "disease" at all, but, on the contrary, can contribute to neo-industrial diversification of production in oil-producing countries with high consumption levels.

The potential economic opportunities of Saudi Arabia, which can be realized in the very near future, are evidenced by the first brilliant results of the practical implementation of Vision 2030 in Saudi Arabia. This program, quite Keynesian in spirit, developed in 2016, has clearly demonstrated its ability to serve as a powerful source of additional investment and consumer demand (IMF, 2023). Largely thanks to this program, Saudi Arabia became the G20's fastest-growing economy in 2022.

Overall growth reached 8.7 percent, including 4.8 percent growth in non-oil GDP, driven by robust private consumption and non-oil private investment, including giant projects. Saudi Arabia's unemployment rate is currently at a historic low. With the overall unemployment rate falling to 4.8 percent by the end of 2022, youth unemployment has halved in two years to 16 percent in 2022, and female labor force participation has reached 36 percent, exceeding the Vision's target of 30 percent 2030." Moreover, with such rapid economic growth in the non-oil sector, inflation remains low. In 2022, the average consumer price index rose 2.5 percent year-over-year. Despite rising to 3.4 percent year-on-year in early 2023, headline inflation returned to 2.7 percent year-on-year in April 2023. Non-oil sector growth is expected to remain strong going forward as strong consumer spending and accelerated investment projects drive aggregate demand (IMF, 2023).

The brilliant economic results of the ongoing practical implementation of Vision 2030 show the high macroeconomic efficiency of investments in ambitious large-scale projects in Saudi Arabia. This undoubted economic success clearly demonstrates Saudi Arabia's potential readiness to implement a large-scale historical project of advanced neo-industrial diversification. Such a controlled neo-industrial transformation, which means the creation of a fundamentally new historical model of the information society, will allow Saudi Arabia to move from catching-up development to a trajectory of accelerated economic development. An important role in this process can be played by the systematically organized creation and development of the market for “digital” enterprises based on the institutional mechanism of engineering *istisna*.

3. Institutional Mechanism of Engineering *Istisna*

The problem of the optimal relationship between active state regulation and spontaneous self-regulation of the economy runs through the entire history of Western economic thought. The entire development of Western economic thought appears from this point of view as a struggle between economic liberalism and supporters of active government regulation. However, despite their ongoing opposition, both theories have something essential in common. None of these directions, both liberal and anti-liberal, have ever linked the problem of regulation and deregulation with the distinction in a single economic system of two different mechanisms – the mechanism of development and the mechanism of economic functioning. Economic theory has never tried to tie into one knot such two binary oppositions as regulation and deregulation, on the one hand, and the functioning and development of the economy, on the other. On the contrary, Western thought tends to view the economic system simply as an obvious, immediately given, self-evident, unproblematic unity of functioning and development. Such tacit ignorance of the hidden, dormant potential in the depths of the economic system for the separation of the mechanism of functioning and the mechanism of development has become a firmly rooted intellectual tradition for economic theory. But maybe economic theory did not separate these mechanisms simply because this cannot be done at all? One of the purposes of this article is to show that this is not the case.

This is not a purely speculative question. It captures the very essence of the economic history of the past and present centuries. As is known, the Soviet system made it possible to systematically accumulate scientific and production potential, but could not ensure its effective use due to the lack of a market mechanism for the functioning of the economy. Due to the non-market and therefore ineffective functioning mechanism, the possibilities for systematic economic development here could not be fully used. The Soviet economy could grow, but was not able to function effectively, and this was manifested in a constant surplus of some goods and shortages of others.

Of course, a market system can ensure a more efficient functioning of the economy. But with development, not everything is so smooth here. John Keynes emphasized the capricious, unstable nature of private investment. He viewed them as the most important source of macroeconomic instability. The instability of private investment, their economically dangerous dependence on changes in the mood of entrepreneurs and, consequently, on the entire complex range of their psychological experiences, as is known, caused the greatest anxiety in Keynes (Keynes, (1936) 2018, p. 125-127). This instability of private investment is a significant drawback of the spontaneous method of development. Therefore, the Saudi economic model may well discard the weaknesses of these opposing systems and take on their strengths based on combining predominantly competitive functioning with predominantly planned economic development.

It must be taken into account that neither purely private nor purely public investments, taken separately from each other, nor even their simple mechanical combination are the optimal option for the economic system. The problem, therefore, is to create an institutional mechanism that ensures their organic connection, allowing them to be firmly linked into a single, continuously operating investment system that would be capable of ensuring consistent and vigorous diversification of the economy.

The scheme of such an institutional mechanism itself is extremely simple. Its top level is the state-organized creation of "smart" comprehensively automated enterprises that correspond to the technological achievements of the fourth industrial revolution. But the thing is that these "smart" enterprises are not just created. They are created in accordance with the *istisna* contract as goods for private orders for subsequent functioning on a market basis in competition with other private enterprises. Such an organized creation of "smart" enterprises for private orders on the basis of the *istisna* contract constitutes, as it were, the upper level of the new investment system, ensuring the consciously controlled development of neo-industrial production, while, on the other hand, the lower level of this system ensures the competitive market functioning of new enterprises.

The absence of a long gap in time between the creation and sale of an enterprise to a private customer is very important not only technologically, but also economically. This creates an economic opportunity to directly compare the price of an enterprise with the costs of its creation, which makes it possible to sharply limit the possibility of abuse. In such an investment system, cost calculation becomes clear market criteria for the efficiency of spending money on creating an enterprise.

Such an institutional mechanism can become a powerful tool for stimulating private investment in the development of neo-industrial production, not only internal, but also external, and thereby compensate for the insufficient activity of private business in this direction. By offering private business to order the creation of new enterprises under the *istisna* contract, the state will have the opportunity to involve business in such industrial sectors, without the development of which full-scale diversification and structural restructuring of the economy based on the achievements of the fourth industrial revolution is impossible today.

It should also be emphasized that such an investment mechanism not only does not lead to monopoly, but, on the contrary, can become a powerful factor in enhancing competition and increasing the competitiveness of national producers. New enterprises organized in this way will enter into competition with already operating enterprises and, in including with foreign enterprises selling their products on this national market.

The National Engineering Company may be at the center of such an institutional mechanism. Although it should not be purely state-owned,

the state can at the same time be one of its shareholders. The purchase of shares by a private investor is combined here with an *istisna* agreement, in which all the parameters, technical characteristics and sequence of creating a new enterprise are clearly defined. If the enterprise is created in full accordance with this agreement, then the shareholder (individual or institutional) pays its cost by returning the company's shares in exchange for ownership of the enterprise. If an enterprise is created in violation of the *istisna* contract, then the shareholder may refuse to pay for it with his shares and lawfully demand the elimination of violations of the *istisna* contract either by appropriately remaking the created enterprise or by creating a new enterprise in full compliance with the *istisna* contract. Thus, with this transactional practice, a private investor first buys shares of the engineering company, and then pays the cost of the order with these shares, when the enterprise has already been created in full accordance with the *istisna* contract.

In this case, possible losses of the National Engineering Company can be covered by the purchase of its shares by the state. Engineering *istisna* implies the possibility of refusing to pay for the enterprise with shares of the engineering company if the enterprise was created in violation of the *istisna* agreement. In the case of such a legitimate refusal, the state can cover the loss of the engineering company by buying out its shares and using them to strengthen its control in order to improve the activities of the engineering company. Unlike private and corporate entities, the state does not use these shares to purchase enterprises but retains the shares for control and management. Thus, a decrease in the quality of engineering activities is automatically accompanied by the acquisition of company shares, and this allows the state to strengthen its control and use it to improve engineering. And, on the contrary, with sufficiently effective engineering activities, the company does not have to cover significant losses, and state control over the company's activities remains at the same level. Thus, an automatic regulator of state control over the activities of the National Engineering Company is built into the institutional mechanism of engineering *istisna*, which allows automatically strengthening control when financial results deteriorate and leaving control at the same level with relatively normal financial results of engineering activities.

This "trial and error" method will allow us to empirically find the most promising areas of neo-industrial diversification of the Saudi economy, which are difficult to determine a priori. Each such investment is a kind of "reconnaissance in force", designed to help find optimal directions for controlled diversification of production and separate them from those that in practice may turn out to be ineffective. Therefore, from the point of view of the economic strategy of the state, it may be quite acceptable to cover possible losses of the National Engineering Company. These possible losses are essentially a kind of strategic costs of managed neo-industrial diversification, carried out on the basis of the institutional mechanism of engineering*istisna*.

The fourth industrial revolution makes the individual form of communication between production and consumption characteristic of ordinary industrial goods. Engineering *istisna* is capable of extending this individual method of market communication between sellers and buyers to a fundamentally new type of product – to "smart" enterprises. At the same time, "smart" enterprises not only produce consumer goods by individual orders, but are also created as complex investment goods for sale by individual orders. Thus, customization and even customerization are possible in relation not only to consumer goods, but also to technologically complex investment goods of a special kind, which in the neo-industrial investment system are new, comprehensively automated enterprises themselves. For this purpose, the National Engineering Company can develop virtual electronic models of such "smart" enterprises and send them to the widest possible circle of various economic entities. At

the same time, the possibility of customization is left, that is, modification of the virtual model of the enterprise in accordance with an individual order. After the formation of a customized model of the enterprise and the agreement on the price, an engineering *istisna* contract can be concluded. It specifies not only the price, but also all the technological parameters of the new enterprise.

Thus, the National Engineering Company can take on the role of a so-called system integrator, which usually mediates the connection between the consumer and the manufacturer of industrial equipment in the modern engineering market. Since modern production is characterized by the systematic use of machine tools and other industrial equipment, such system integrators are becoming key players in the industrial engineering market (Erol, & Sihn, 2017). They select all the necessary equipment, form the entire turnkey technological chain, and sometimes ensure its launch and subsequent maintenance, that is, full engineering and service (Buyurgan, & Saygin, 2008). In a neo-industrial investment system of the Saudi type, all these functions of a system integrator can be assumed by the National Engineering Company.

Engineering *istisna* can take on an active, offensive character if the National Engineering Company offers owners of monetary capital various projects of "smart" enterprises that it can create if it receives an appropriate individual order, taking into account the modifications that the buyer insists on. The engineering company does not have to wait for the client, but itself sends the draft *istisna* contract to potential buyers of new enterprises. If a buyer cannot be found, then the enterprise is not created, and the investment project is temporarily not implemented until buyers of the future enterprise appear. Of course, clients, in turn, can make their own changes and additions to the project and the *istisna* contract and propose them to the engineering company. The main thing is that as a result of these customization iterations, the *istisna* contract leaves as little room as possible for uncertainty and asymmetry of information.

Thus, such a traditional Islamic economic institution as *istisna* can become a key element of the institutional mechanism of neo-industrial diversification of the Saudi Arabian economy. It allows one to overcome the relatively narrow investment boundaries of private business and remove many of the economic barriers that hinder the diversification of industrial production in Saudi Arabia. At the same time, the upper level of the new investment system is designed to organize the consistent diversification of production, and the lower level is able to ensure the effective use of accumulated production potential in the process of market functioning of neo-industrial enterprises on a competitive basis. This combination of centrally managed neo-industrial diversification and the competitive functioning of neo-industrial enterprises opens up new horizons for Saudi Arabia, which has sufficient financial resources to practically implement the technological capabilities of the fourth industrial revolution.

On the other hand, the engineering version of *istisna* will stimulate not only private investment, but also household savings. It should be borne in mind that despite the generally high level of savings in Saudi Arabia, the bulk of it belongs to the state, while the household savings rate remains below the 10 percent global standard, recognized as the minimum level ensuring long-term financial independence (KPMG, 2020) link to sources). Therefore, one of Saudi Arabia's macroeconomic problems remains the gap between government savings and household savings. To stimulate the household savings and support the growth of the national economy, Saudi Arabia has adopted a corresponding financial sector development program (FSDP) SSDP. To diversify it, it is envisaged to encourage and provide new financial planning opportunities by expanding

the savings products available in the market, strengthening the savings ecosystem and improving financial literacy (KPMG, 2020).

An equally effective way to solve the problem of household savings can be the massive involvement of these savings in the process of neo-industrial diversification through the institutional mechanism of engineering *istisna*. The National Engineering Company, located at the center of this institutional mechanism, is capable of not only stimulating household savings, but also organically linking them directly with private and public investments. Therefore, engineering *istisna* can become an institutional mechanism for such a direct connection of savings and investments, not mediated by the money capital market and interest rates, which completely excludes debt and interest from its purely "equity" scheme for financing real investments in the process of controlled neo-industrial diversification of production. This liberation of the investment system from interest and other "debt" elements is fully consistent with the principles of Islamic economics, which gives preference to the equity method of financing investments over the debt method.

The institutional mechanism of engineering *istisna* makes it possible to reduce the costs of investment transactions to such a level that allows filling the traditional institutional form of *istisna* with new technological content and thereby opens the way for neo-industrial diversification of production. Engineering *istisna* appears here as an adequate institutional form of a new, neo-industrial transactions type associated with the production of complex automated enterprises as particularly complex investment goods for sale under private and corporate orders. Therefore, the practical use of the engineering *istisna*in the process of neo-industrial diversification in Saudi Arabia can become one of the most important areas of coverage of the Islamic economy, along with banking directly in the area of high-tech neo-industrial production associated with the implementation of the fourth industrial revolution achievements.

Thus, thanks to the institutional mechanism of engineering *istisna*, Saudi Arabia can "cut the corner" and immediately move on to neo-industrial diversification by creating comprehensively automated enterprises, bypassing the classical industrial stage of development. Thus, Saudi Arabia can become a global leader of a centrally controlled neo-industrial transformation, just as England became the leader of the spontaneous process classical industrial transformation more than two hundred years ago.

4. Neo-Industrial Techno-Structure and Its Perspectives in Saudi Arabia

One of the most important conceptual instruments of ideological blocking of the controlled neo-industrial transformation in modern Western society is neoliberal economic theory. It includes, first of all, the neoclassical mainstream, as well as the adjacent neo-institutional direction. Neo-institutionalism is called upon to push classical American institutionalism into the background, assigning it the not very attractive label of "old" institutionalism. Despite significant methodological differences, neo-institutionalism in a purely ideological sense is essentially an institutional continuation and development of neoclassical economic liberalism. In addition, the neo-institutional direction includes the so-called "new economic history" of D. North, built on the principle of the "end of history" in the sense that it connects historical progress with the development of the specification and protection of property rights, which, of course, means first of all, private property (North, 1992). And, since in the modern Western economy the level of specification and protection of private property really reaches its highest point, Western society is actually considered in neo-institutional theory as the highest point of historical progress, and there is no point in talking about any higher level of development at all.

On the other hand, classical American institutionalism, including John Galbraith and his concept of techno-structure, remains outside the modern neoliberal mainstream of economic theory. This concept covers the widest possible range of professionals who are specialists in a wide variety of fields. It includes not only purely technical specialists, but also various kinds of experts, organizers, economists, managers, lawyers, marketing, advertising, design specialists, etc. (Galbraith, (1967) 2007, p.112-119). And although, as is known, at one time and especially in the era of the neoliberal "market renaissance" some of the conclusions of J. Galbraith were subject to fair criticism, the very fact of the formation in large corporations of such a techno-structure based on the division of functions between various specialists can hardly raise doubts.

The relevance of this concept in the current century is due to the fact that in the conditions of the fourth industrial revolution, the techno-structure can, in principle, go beyond corporations and move to the supra-corporate, that is, to the regional and national level. The institutional concept of such a supra-corporate techno-structure may be one of those alternatives that is much more consistent with Islamic economics than the mainstream "neoclassical synthesis", whose macroeconomic model is centered on the interest rate. Therefore, by combining the principles of Islamic economics with some critically revised elements of classical institutionalism, the possibility of creating the concept of a national techno-structure for its practical application in Saudi Arabia opens up.

Developing his concept of techno-structure, J. Galbraith clearly shows how many different professionals an industrial corporation needs to make a qualified decision on product release (Galbraith, (1967) 2007, p.155-159). Obviously, a qualified decision on creating a new enterprise, and even more so on creating a modern "smart" enterprise based on the use of technological achievements of the fourth industrial revolution, is even more complex. And even more qualified specialists are needed to make a well-founded choice on such a complex decision. Therefore, for technologically and economically sound solutions of this level of complexity, a corporate techno-structure may not be enough. Since the complexity of such decisions may exceed the professional capabilities of the corporate techno-structure, it may refrain from creating new technologically complex enterprises in order to avoid insufficiently informed decisions that could cause losses to the corporation. Therefore, to optimize complex decisions on the creation of "digital", comprehensively automated enterprises, a techno-structure of a higher, supra-corporate level is needed, professionally specializing in the creation of new enterprises as particularly complex goods for sale on individual orders. The center of such a supra-corporate, nationwide techno-structure in Saudi Arabia could be the National Engineering Company.

If in the USA the corporate techno-structure is subordinated to private business, then in Saudi Arabia the national techno-structure may well be subordinated to the state and implement its economic strategy in the same way as the corporate techno-structure implements the interests of big business. Through the institutional mechanism of engineering *istisna*, the Saudi state can consciously control the process of neo-industrial diversification, using the national techno-structure as an organizational tool to manage this complex transformation process, which involves the organized creation of neo-industrial businesses for custom sales.

Thus, the Saudi state is able to make the national techno-structure an effective instrument of its economic policy and use this powerful organizational tool to manage the process of neo-industrial diversification of the economy. Thanks to a strong political will, not restrained by formal American-style democracy, a controlled neo-industrial transformation in Saudi Arabia can, in principle, occur much faster than a

spontaneous neo-industrial transformation in Western countries. This opens the way for a consciously controlled transition of Saudi Arabia directly to the neo-industrial model of the information society, bypassing the classical industrial stage of development. The objective conditions for such an advanced neo-industrial transformation of the Saudi economy are evident. There is also a necessary subjective condition. The presence of strong and decisive political will is evidenced by the Vision 2030 program and the successful start of its practical implementation, which has already allowed Saudi Arabia to achieve excellent economic results.

As for the Chinese experience of successful industrial development in the last four decades, this model is completely unsuitable for Saudi Arabia, since the socio-economic tasks of China and Saudi Arabia are objectively not only different, but also partly opposite. During its industrial transformation, China created labor-intensive industries capable of employing and lifting hundreds of millions of people out of poverty (Zhu, & Orlik, 2022; Sasaki, Sakata, Mukoyama, & Yoshino, 2021). On the contrary, for modern Saudi Arabia, the problem of prestigious employment is more pressing, and the creation of capital-intensive industries in Industry 4.0 can contribute to a more complete solution to it. The use of the institutional mechanism of engineering *istisna* for this purpose can also help solve this problem of prestigious employment specific to Saudi Arabia. Educated Saudi youth will have a fairly prestigious opportunity to participate in the neo-industrial techno-structure, which is designed to directly manage the economic development of the country along the path of diversification of production.

Young people in Saudi Arabia are not very keen to work in the private sector, partly because they do not want and find it humiliating to act as a labor commodity for private firms, which is bought and sold in the labor market like ordinary goods. But the opportunity to become part of a neo-industrial techno-structure that controls the creation of new enterprises as highly complex goods intended for sale to individual orders is a completely different matter. Such a neo-industrial economy may turn out to be much more attractive for it than classical industrial work. We are talking about the employment of not just labor, as in Keynes's model, but the prestigious employment of individual human capital as an element of the techno-structure, and this can stimulate more and more new investments in human capital. Such an exciting high-tech project can captivate that part of Saudi youth who are not employed in the public sector and at the same time do not seek to work in the private sector. Moreover, participation in the neo-industrial techno-structure will provide a high social status, incomparable with the position of an employee in classical industrial production, since creating and selling new high-tech enterprises is not at all like selling your labor to a private company. Therefore, while the prospect of commoditizing "labor" for wage labor in private firms does not appeal to Saudi youth, the prospect of creating and selling a very different kind of product – "smart" enterprises – may captivate them and capture their imagination.

At the same time, it is necessary to take into account the features of a new way of connecting production with consumption, based on individual orders. It promotes the development of technological customization and customerization and thereby geographically brings production closer to the consumer. Therefore, we can talk not only about a national, but also about a regional techno-structure, that is, about the creation of not only national, but also regional engineering companies. In addition, when talking about creating new prestigious jobs for educated Saudi youth, one must also fully take into account the "new" corporate techno-structure, that is, the techno-structure of the neo-industrial enterprises themselves, created by National and regional engineering companies for sale. Thus, when considering the prospects

for increasing prestigious youth employment, it is necessary to fully take into account the entire unified system of neo-industrial techno-structure, which includes not only national and regional, but also the “new” corporate techno-structure closely related to them.

Currently, the discussion about the possible consequences of the fourth industrial revolution and its impact on employment continues in the world economic literature. At the same time, "optimistic" forecasts show that it will not have a catastrophic impact on the overall volume of employment. On the contrary, "pessimists" focus on the threat of mass unemployment. However, both authors practically agree that the fourth industrial revolution can change the structure of employment in the direction of the creative transformation of human activity. At the same time, there is no doubt that the industrial Internet of Things and automation of production are the technological basis for the transformation of low-prestige employment into prestigious employment associated with creative activity. The debatable issue is, first of all, whether this prestigious creative employment will be able to compensate for the displacement of people from the sphere of low-prestige and non-creative work. It is this quantitative problem that serves as the main dividing line between "optimists" and "pessimists" regarding the impact of the fourth industrial revolution on employment. As for the changes in the employment structure under the influence of automation, they are quite obvious. They are shown, for example, by forecasts The Future of Work in Europe and The Future of Work in the USA.

Table 1 presents some of the results of the Future of Work in Europe study conducted by the McKinsey Global Institute based on a detailed analysis of 1,095 local labor markets across Europe, including 285 megacities.

Table -1- Forecast of the influx of automation on the employment structure in the EU or the period until 2030

Specialties	Increase in the number of jobs	Decrease in the number of jobs	Share of employees without higher education, %
Scientific and technical workers	+4,0		≤ 29
Business occupations and lawyers	+3,9		30 – 59
Social workers	+2,9		60 – 89
Managers	+2,3		30 – 59
Education and training of labor force	+2,2		≤ 29
Culture and art workers	+1,8		30 – 59
Medical and health care workers	+1,7		≤ 29
Transport workers		- 0,6	≥ 90

Workers of the extractive industry and agriculture		- 0,7	≥ 90
Mechanics and repairers		- 0,9	60 – 89
Waiters		- 1,1	60 – 89
Construction workers		- 1,2	≥ 90
Communications workers		- 1,2	30 – 59
Retail workers		- 1,4	60 – 89
Industrial workers		- 4,5	≥ 90
Office workers		- 5,0	60 – 89

Source: McKinsey Global Institute (2020).

Studies have shown that job growth has benefited the highest-skilled workers (such as lawyers and health professionals) in all local labor markets. Projections show that activities requiring mainly physical and manual skills will decline by 18 percent by 2030 in Europe, while those requiring standard basic skills will decline by 28 percent. On the contrary, activities requiring high-tech skills will grow in all industries (The Future of Work in Europe).

Forecasts show that many of today's 235 million employed people in Europe will face at least some changes in their occupations in one way or another. Up to 21 million people may have to leave shrinking jobs. 94 million workers (about 40 percent of the 2018 workforce) may not need to change careers, but they will still need to acquire new skills because more than 20 percent of what they do today can be automated. In general, around the world, according to preliminary estimates, about half of all labor activities have technological potential for automation due to the introduction of already existing and currently demonstrated technologies (The Future of Work in Europe).

Table 2 allows you to get an idea of which professions in the USA have the highest automation potential in the future.

Table -2- Automation prospects of 10 different specialties in the USA

Specialties	The number of workers who are potentially replaced by 2030, thousand	Substitution share, %	Labor force share, %
Fast food workers	1,375	28	2,8
Retail workers	1,180	23	2,9
Office workers	1,159	34	2,0
Exchange workers	1,020	46	1,3
Accountants and auditors	921	49	1,1
Cashiers	917	24	2,3
Secretaries and administrators	824	30	1,6
Waiters	726	25	1,7
Chefs, restauranteurs	638	47	0,8
Service personnel	507	16	1,8

Source: McKinsey Global Institute (2019).

However, it should be noted that in the US, people with a high school education or less are four times more likely to be at risk of being cut by automation than people with a bachelor's degree or higher, and 14 times more vulnerable than people with a college degree (The Future of Work in America).

Thus, automation is the technological basis for the transformation of human activity in the direction of transition from boring, unskilled and low-prestige work to interesting and prestigious skilled work. In Saudi Arabia, this general trend of the fourth industrial revolution may be supplemented by the creation of a national, regional and local technostructure, which is a potential source of employment for Saudi youth. It should be taken into account that the most important specific feature of the labor market in Saudi Arabia is such a sharp bifurcation of its structure, in which foreign workers are mainly engaged in low-prestige work, while Saudi citizens, on the contrary, strive for prestigious employment. However, the lack of prestigious employment contributes to youth unemployment. Therefore, the fourth industrial revolution can help solve the problem of prestigious employment needed by young people. At the same time, the fourth industrial revolution can reduce the volume of

low-prestige work performed mainly by migrants. However, it should be taken into account that neo-industrial diversification does not mean so much the technological modernization of existing enterprises as the creation of completely new "smart" industrial enterprises. The creation of such "smart" enterprises can increase prestigious employment in the techno-structure. But since we are talking specifically about new enterprises, this does not directly affect the employment of workers at previous enterprises. Only indirect competitive pressure of new enterprises on the market can indirectly contribute to the reduction of industrial employment. But this factor is not significant in this case, since neo-industrial diversification means, first of all, the creation of enterprises, especially in new industries. New enterprises do not directly compete with existing industrial enterprises and cannot have a significant impact on the employment of industrial workers. Therefore, neo-industrial transformation can cause changes in the labor market that are favorable for highly educated Saudi youth, and, on the other hand, may not have a significant impact on foreign workers. Thus, overall, the creation of smart enterprises in the process of neo-industrial diversification can have a positive impact on the labor market in Saudi Arabia.

5. Summary and Conclusions

Based on the fact that information asymmetry means actual inequality between the parties to a transaction and can become a source of unfair exchange (Sultan, 2023; Al-Masri, 2021), Islamic economics, in its pursuit of fairness, seeks to minimize uncertainty in order to weaken information asymmetry (Riduwan, R., & Danupranata G., 2020; Abdus, Gardner, & Cook, 2005). This largely explains the surprising at first glance correspondence between the institution of *istisna* and the individual way of connecting production and consumption, which is being formed in the process of the fourth industrial revolution. If previously the process of customization and customerization was predominantly institutional in nature, now it is becoming a technological process. Since, in the conditions of such technological customization and customerization, the buyer-customer knows no less about the product he needs than the seller, this actually means a technological solution to the problem of information asymmetry, primarily in relation to consumer goods. Thus, the information society of the neo-industrial type is capable of technologically overcoming the asymmetry of information, which *istisna* seeks to eliminate institutionally. Therefore, in the future, as it further unfolds, the fourth industrial revolution is capable of filling the Islamic economic institution of *istisna*, traditionally focused on overcoming information asymmetry, with adequate technological content.

However, now we see that, in principle, *istisna* may fully correspond not only to the neo-industrial method of producing consumer goods, but also to the neo-industrial method of creating special investment goods of a new type, namely, complexly automated enterprises. The institutional mechanism of engineering *istisna* allows us to extend the principle of individual orders to the creation of such "digital" enterprises. If consumer *istisna* institutionally corresponds to a new technological way of connecting production with consumers, then, on the other hand, engineering *istisna* means the creation of neo-industrial enterprises themselves for sale on individual orders. Thus, in Saudi Arabia, *istisna* can acquire a two-level character, connecting consumer and engineering *istisna* into a single neo-industrial production system, which is an adequate production basis for the new information society.

When considering the institution of *istisna* in this way, one must take into account the generally accepted understanding of uncertainty as a measure of information, which has become established in modern science. Uncertainty is considered as a situation in which there is a complete or partial lack of

information about the probability of future events. In other words, uncertainty is a lack of information. Since information is the opposite of uncertainty, the tendency to overcome uncertainty is inherent in the very nature of the information society. But, on the other hand, the focus on overcoming uncertainty and eliminating information asymmetry is characteristic of Islamic economics. Thus, the desire to overcome uncertainty is common to the Islamic economy and the information society. However, they realize this desire in different ways: Islamic economics – through institutional means, information society – through technological means based on information technologies In the process of the fourth industrial revolution, information technologies begin to penetrate production and determine the way it communicates with consumers. That is why the Islamic economic institute *istisna* is not accidental, but quite naturally adequate to the process of creating a neo-industrial production basis for the information society.

Thus, the problem of uncertainty and its overcoming is one of the central ones not only for Islamic economics, but also, on the other hand, for the modern information society, which today is just beginning to form its neo-industrial production base in the process of the fourth industrial revolution. It is clear from this that the correspondence between the Islamic economic institution of *istisna* and the neo-industrial model of the information society is by no means accidental, given the focus of *istisna* on institutionally overcoming uncertainty and information asymmetry in economic relations between people. Therefore, the principles of Islamic economics, which fully takes into account the factor of uncertainty, are methodologically more relevant to the economic problems of the information society than the neoclassical mainstream of Western economic thought, which tends to replace measurable risk with genuine immeasurable uncertainty. And just as in the field of economic thought, Islamic economics is more adequate to the analysis of information problems from the standpoint of immeasurable uncertainty than the neoclassical mainstream of Western economics, so in the field of real economic policy, Saudi Arabia can intercept the historical initiative from the West in the process of controlled neo-industrial transformation.

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الآلية المؤسسية للاستصناع الهندسي وآفاقه في المملكة العربية السعودية

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المستخلص. تطرح المقالة مشكلة التنوع الصناعي الجديد في المملكة العربية السعودية باستخدام الآلية المؤسسية للاستصناع الهندسي. وتوضح المقالة أن المملكة العربية السعودية لديها جميع الشروط الموضوعية والذاتية لإنشاء نموذج صناعي جديد لمجتمع المعلومات بنجاح في عملية الثورة الصناعية الرابعة. ويُستخدَم نهج مؤسسي متوازن لتحليل هذه المشكلة، والذي يفترض وحدة وترابط التغيرات المؤسسية والتكنولوجية في عملية التنوع الصناعي الجديد في المملكة العربية السعودية . ويخلص المؤلفون إلى أن معهد الاستصناع الهندسي سيسمح للمملكة العربية السعودية بتنظيم إنشاء مؤسسات صناعية جديدة "ذكيّة" وآلية بأوامر من المستثمرين من القطاع الخاص .وبفضل هذه الآلية المؤسسية، يمكن للمملكة العربية السعودية في المنظور التاريخي أن تصبح رائدة العالم في العملية الخاضعة للرقابة للثورة الصناعية الرابعة، تمامًا كما أصبحت إنجلترا رائدة العملية العفوية للثورة الصناعية الأولى منذ أكثر من مِئتي عام.

الكلمات الدَّالة: الاستصناع الهندسي، الاقتصاد الإسلامي، المملكة العربية السعودية، الثورة الصناعية الرابعة التنوع الصناعي الجديد، مجتمع المعلومات، البنية التكنولوجية الوطنية، الإنتاج الآلي، التخصيص

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تصنيف KAUJIE: G61, K10