HUMAN-ORIENTED MANUFACTURING AND REINDUSTRIALIZATION PROCESSES IN THE DIFFERENT SOCIO-ECONOMIC SYSTEMS

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Abstract
The key goal of the article is presenting a review of how the reindustrialization processes affect design and functioning of the human-oriented manufacturing systems. The features of these production systems' functioning in the countries with different socio-economic systems are also analyzed. It's also proved that in the period of reindustrialization social factors' role becomes the most important during the development of human-oriented manufacturing systems. Thus, the basic result of these systems' functioning is the increasing of the society's human capital and social capital levels. It's also presented an original set of instruments that is to be used to manage the processes of designing and development of the human-oriented manufacturing systems. The instruments' work is based on the entropy approach, information theory of value, technological paradigm concept and the ways of overcoming the opportunistic behavior.

Keywords:
Human-oriented manufacturing, reindustrialization, production systems, design, entropy, information cost, technological paradigm, opportunistic behavior.

1 INTRODUCTION
An actual development tendency in the production development all over the world is reindustrialization. It replaced the deindustrialization of the 20th century's last decades in the more economically developed countries. The basic reasons for the development of deindustrialization processes were corporations' commercial interests. They moved a lot of their industrial production facilities to the countries with cheaper labor force and with better socio-economic conditions for their business (first of all, to the countries of SEA). This tendency was theoretically grounded on the postindustrial society concept [1], [2]. This concept was later found to be a failure according to the actual tendencies in social and economic development, and now the failure is proved by numerous modern scientists [3], [4]. It's possible to declare that deindustrialization is one of the periods of the industrial development during the formation of the information economy [5].

Understanding of how dangerous for the national economy the deindustrialization may be (because it causes growth of the Asian enterprises' potential and appearance of the new competitors in the market), and the development of technologies that makes production in the more economically developed countries profitable become the reasons for beginning of reindustrialization (also known as The Third Industrial Revolution or New Industrial Revolution) in the beginning of 21st century.

Production systems of any age of the production development (Pre-Industrial Age, Industrial Age and Information Age) may be determined by numerous special features [5], [6]. The similar features may be used to characterize both deindustrialization and reindustrialization periods.

One of the very important features in the said periods is the appearance and development of the human-oriented manufacturing system (HOMS). This term was first used in the end of 1970th – beginning of 1980th [7], [8] and the said time was known as the very beginning of deindustrialization period. Researches in the field of human-oriented manufacturing working out and development were the most active in the first and second decades of the 21st century – during the reindustrialization period [9], [10].

To solve the problems that exist during the working out of the human-oriented manufacturing systems in the most efficient ways during the reindustrialization period it's important to review these systems' functioning both in the Industrial Age (the beginning of deindustrialization) and during the reindustrialization period. It's also important to analyze the features of these systems' development in the different socio-economic systems and to work out the instruments to manage the development processes during the working out of the modern human-oriented manufacturing systems.

2 DEVELOPMENT OF THE HOMS DURING THE REINDUSTRIALIZATION PERIOD AND BEFORE IT
Creating and development of the human-oriented manufacturing required numerous researches and design projects. These researches and projects were taken up in the second half of the 20 century. It was the final period of the Industrial Age and the beginning of deindustrialization.

In the Industrial Age was worked out another methodology that is close to the concept of human-oriented design. It is ErgoDesign concept that was widely presented from the late 1960th to early 1980th. Well-known authors, such as E. Grandjean (1969) [11], D. Azrican (1987) [12] and others, described ErgoDesign as the technology of mechanical design that differs from “traditional” ergonomic and artistic design. A declared objective of the ErgoDesign is making human’s being successful and thriving basing on three aspects of design, which are inseparably linked with each other. These aspects are the convenience, the comfort and the esthetic perfection of the facilities and conditions for the human being. But this concept doesn’t pay attention to the social aspects of the human being. That’s why, in contrast with the nowadays explorers of the ErgoDesign axiological aspects (T. Balland, 2004) [13], the authors can’t represent ErgoDesign as something similar to human-oriented design.

Working out and worldwide acceptance of the ISO standards [14], [15], [16] was an important step on the way to the perfection of human-oriented manufacturing. First of them were standards of human-oriented designing of the
interactive computer systems. These standards require using the human-centered design as an only way to efficient design of the interactive systems that include hardware and software components as the integral parts. The system gets information from the user, and "answers his questions" helping to do the job or to accomplish the task.

It’s important to notice that these standards use a term "human-centered design" instead of "user-centered design". The idea of changing the term is to show that the concepts may affect not only users but other stakeholders too.

A special attention is paid by the authors of standards to ergonomics of the interactive systems’ design and exploitation. This approach seems to be close to the said ErgoDesign [11], [12]. That’s why ISO standards [14], [15], [16] should be attributed to the methodology of Industrial Age and be improved for the efficient use during the reindustrialization period.

The well-known researches are dedicated to bringing to light the nature of social aspects that make production systems function. The results of these researches may be used as a methodological basis for working out of the human-oriented manufacturing in the reindustrialization period.

Before the beginning of reindustrialization period in the world economy numerous ways of affecting the social results of production systems’ functioning by their constructive features were reviewed in well-known works. As the example the authors can present works by E. Trist and F. Emery [17] and researches that were carried out by The Tavistock Institute of Human Relations (TIHR) in London [18]. Authors of these works presented a sociotechnical system (STS) concept [19]. STS is any system in which its functioning take part both the fixed capital components (first of all, production facilities) and humans. It’s obvious that any production system is a kind of sociotechnical system. In the reindustrialization period the STS concept becomes particularly useful and important.

In the work by E. Arai (2000) [10] presented a human-oriented structure of the production enterprise and a list of management methods to be used as a part of the structure. The proposed structure includes two technologies: a factory communication network using the active database system and a dynamic scheduling method to guarantee the workers’ satisfaction. It’s obvious that the evaluation of workers’ satisfaction level can’t be objective in full measure, but to make it as objective as possible it should be based on the expert evaluation made by workers themselves (a kind of feedback).

The concept of “reindustrialization" (“the third industrial revolution") was presented in the works by J. Rifkin [20], P. March [1] and C. Anderson [2].

Well-known American economist and ecologist J. Rifkin presents an idea that the traditional centralized models of the business systems should be replaced by another type of business structures in the next 50 years. The hierarchical organizational structure of the economic and political powers that appeared after the first and second production revolutions should be replaced by the system of "horizontal" or "one-level" interactions [20]. It’s obvious that “horizontal" and “one-level" interactions-based management systems are more “flexible”. The levels of management decisions complexity and personnel qualification in these systems are to be increased.

In the well-known work [1] by P. March author gives a review of the 250 years long history of the industrial production's development. According to his ideas, the nowadays industrial revolution is determined by the developments of the past. He also presents a list of the key changes that affect nowadays industrial production, such as the development of modern technologies, great interest in the non-standard products for non-typical customers, participation of the numerous countries in the world production and the increasing importance of the sustainable production. So, according to P. March, the basic sign of reindustrialization processes’ beginning is transition from high-volume or mass production to the production of goods that satisfy a certain human’s (customer’s) wants. It’s possible to say that P. March declares the human-oriented manufacturing as a dominating type of manufacturing during the reindustrialization period. There is no doubt that under these conditions the importance of roles played by human and human’s qualification increases greatly because production design and working-out of the technologies is to be carried out not for the mass production of the one product but for the great number of products and small-scale production.

In the book by C. Anderson [2] (published in 2012) author insists that the new production revolution is about to begin in the whole world. The “revolutionary" processes will be based on the development of the open-source 3D design and 3D printing (additive manufacturing). Everyone is about to be able to create a 3D model of the thing he needs using a free design program, or to download the file from the Internet, and then synthesize it with the home 3D printer. Author presents this situation as an example of how means of production become public property (or "everyone's property") according to Karl Marx. Anderson presents an idea that having the additive manufacturing technologies in one hand and innovation Internet technologies in other leads us to the new industrial renaissance, the epoch when everyone has a possibility to be both an inventor and a manufacturer.

In our opinion, C. Anderson overrated the role of additive manufacturing technologies and failed to take into account a great number of the technological problems, which should be solved before the said technologies become widely spread. Even when the said problems are solved using of the additive manufacturing technologies is not always appropriate and economically efficient. But this author’s approach gives us a possibility to glance over the effects of human-oriented manufacturing during the reindustrialization period. The basic ones are “individualization" of the product to satisfy the certain humans' wants and "assigning" the means of production to the certain people. It means not only increasing of the required employees’ qualification level, but also the qualitative changing of the social and economic conditions of the production in general.

The well-known work by I. Tomotoshi (2009) [9] is based on the results of Toshiba Corporation's practical work. Author analyzes the production functioning as the derivant of human factor's acting. The attention is also paid to the kinds of influences that product lifecycle management (PLM), supply chain management (SCM) and project management (PM) bring to bear upon production actions. Author draws a conclusion that the improvement of the production management is to be based on the quantitative assessment of people’s acting as a part of the production system.

Numerous works in the field of human-oriented manufacturing take into account both processes of perfection the production systems and processes, and perfection of the product. Concepts of these researches and the shown ways for the development are presented in Fig. 1. The model is worked out by the authors basing on the above said concepts. It is to represent the human-oriented production systems’ and products’ current state and also to be used during the working out of the new
project that take into account some features of the reindustrialization period.

It's possible to draw a conclusion that creating a human-oriented manufacturing during a reindustrialization period makes the role of the existing processes' social component more important. This conclusion is actual both for the early steps of developing human-oriented production systems (a project statement should include social parameters) and for the results of their functioning (increasing of the human and social capital levels should be taken into account as one of the results). Increasing of the human capital level in the said system depends on the technological perfection of the production system. Increasing of the social capital level, as shown in the work by P. Bourdieu [21], is a result of social production that promotes increasing of the solidarity and confidence levels in the society. Using this idea as a basic statement, the authors conclude that in the reindustrialization period development of the human-oriented manufacturing promotes a social harmony and prevents the appearance of the opportunist behavior of the participating people.

According to the above said it's possible to assume that in the societies with different social and economic systems the processes of human-oriented manufacturing's development and functioning should go in the different ways.

To verify this statement the authors used a comparative analysis of the reindustrialization processes that take place in nowadays Russia and in the most economically developed countries of the world.

3 REINDUSTRIALIZATION OF THE DIFFERENT SOCIO-ECONOMIC SYSTEMS: AFFECTING THE HOMS AND HUMAN CAPITAL LEVELS

A comparative analysis, presented by the authors of the work [22], gives us a possibility to show the differences between reindustrialization processes in the more economically developed countries and in nowadays Russia. The results of the comparison are presented in Tab. 1. Using these results, the authors can make a brief resume of the phenomena that exist during working out of the human-oriented manufacturing system in the period of reindustrialization in Russia and in the more economically developed countries.

It's important to understand that the reasons for deindustrialization in Russia and in the more economically developed countries differ greatly. In the more economically developed countries a basic reason for deindustrialization was a transition to the post-industrial economy (the goal of the transition was getting a commercial advantage from moving the manufacturing to the countries with a cheap labor force). In Russia deindustrialization existed as a result of spontaneous market-style reforms.

The economic conditions in Russia and in the more economically developed countries changed differently too. In the more economically developed countries the result of deindustrialization was a decreasing level of material production because of its partial move to the countries with a cheap labor force in the same time with keeping the high-tech production and R&D in the homeland. The result of such policy is increasing of the human capital indexes in the more economically developed countries. In Russia the result of deindustrialization was decay and primitization of the production and decreasing of the human capital indexes.

Reindustrialization is much more important process for Russia's economy than for other countries, because future deindustrialization for Russian economy is a synonym of total economic destruction and loss of the sovereignty. For the more economically developed countries deindustrialization may mean only the decreasing of competitiveness levels. It happens because of increasing of the same levels in the countries that develop now the material production that is moved from the more economically developed countries.

A situation in nowadays Russia's economy may be an object lesson of how the human capital peculiarly affects the processes of production systems' development during the reindustrialization. Some of the nowadays Russian society's problems are rooted in the social and economic shortcomings of the Soviet period, but most of them are the result of "destroying reforming" that took place in the last 25 years.

The numerous above said problems cause the decreasing of country's human capital development level. But all these problems are less important than the liquidation of the numerous high-tech production enterprises. These enterprises used the early human-oriented production systems that were created in the Soviet period and materialized the human capital of very high levels. People that worked at these enterprises and in these production systems went out of business in the last decade of the 20th century, when Russia's economic policy was ruled by Yeltsin-Gaidar administration and followed the American advisers' recommendations [23]. The period of restoring the existing high-tech enterprises and creating of the new ones in Russia started in the first decade of the 21st century. The most intensive development of the Russian
Table 1. Deindustrialization results and reindustrialization features in the more economically developed countries and in Russia.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>The more economically developed countries (MEDC)</th>
<th>Russia</th>
</tr>
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<tbody>
<tr>
<td>Reasons for deindustrialization</td>
<td>Purposeful transition from the industrial to post-industrial economy</td>
<td>Result of spontaneous market-style reforms</td>
</tr>
<tr>
<td>Nature of the deindustrialization</td>
<td>Decreasing level of material production because of its partial move to other countries in the same time with keeping the high-tech production in the homeland</td>
<td>Decay and primitivization of the production and decreasing of the human capital indexes</td>
</tr>
<tr>
<td>Deindustrialization threats</td>
<td>Decreasing of the competitiveness level</td>
<td>Total economic destruction and loss of the sovereignty</td>
</tr>
<tr>
<td>Level of understanding how the deindustrialization is dangerous and reindustrialization is important</td>
<td>Corporations and government realize the tendencies</td>
<td>The advanced part of the society realizes the tendencies</td>
</tr>
<tr>
<td>Reindustrialization imperative</td>
<td>Cheaper energy sources; decreasing of the transaction costs level; onshoring</td>
<td>Restoration of the production potential and human capital levels</td>
</tr>
<tr>
<td>Top priority tasks for reindustrialization</td>
<td>Different tasks, determined by different corporations basing on their commercial interests</td>
<td>Restoration and development of manufacturing the means of production</td>
</tr>
<tr>
<td>The features of innovations that exist during reindustrialization</td>
<td>Innovation processes lead the production to the next technological paradigm</td>
<td>Innovation processes lead the production to the next technological paradigm</td>
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machine-building and other high-tech manufacturing began in 2014 [24], [25]: these branches of the national economy developed rapidly and increased their competitiveness in spite of the unsuccessful economic blockade by the USA and EU. In the last years in Russia are being developed numerous projects of creating new human-oriented manufacturing. Some of these projects show the encouraging social results of their development [26].

The appearance of the said works may be explained as a result of the economic processes’ becoming more rapid. Using of these concepts prevents the degradation of human capital (like it was in the period of “spontaneous” market-style reforms) and helps to increase the social capital level.

In the earlier periods (the beginning of reindustrialization processes, as noticed in the Introduction) researches in the field of human-oriented manufacturing systems became widely-spread in the science of the more economically developed countries. The reason was an importance for these countries’ companies to compete successfully with the Newly Industrialized Countries (firs of all, Asian) enterprises. This policy required a rapid development of the high-tech production enterprises in the territories of the more economically developed countries, and functioning of these enterprises become a reason for increasing the human capital and social capital levels in these countries.

Summarizing the said, it’s possible to draw a conclusion that in spite of the great differing socio-economic systems of the countries, created in these countries human-oriented manufacturing systems promote the increasing of increasing the human capital and social capital levels in the same way. Organizational and economic instruments to create these systems may also be universal.

4 CREATING OF THE HOMS: METHODOLOGY AND INSTRUMENTS

Basing on the said above, it’s possible to conclude that the methods of working out a human-oriented manufacturing should follow the idea of increasing social capital and human capital levels.

Researches and applied works in this field are well-known since the beginning of 20th century. One of the most known among them is a work by B.-S. Rowntree [27].

The most active and efficient period of researching in this field was a period before the beginning of worldwide reindustrialization processes. As a result, now a great number of works by different scientists give a possibility to review different approaches to the problem.

One of the works in this field, the attention is to be paid to, is a review of definitions and approaches to the understanding of the human factor and human capital in the context of nowadays economic development by A. Kucharikova [28].

As an example of practical approach should be reviewed a work by N.G. Mankiw, D. Romer and D.N. Weil [29]: authors present a model of the human capital’s participation in the processes of technological development.

An examination of the role that human factor plays in the economic growth as in the result of innovation, scientific research and development I is presented in the works by P. Romer [30], R. Lucas [31], and S. Rebelo [32]. They also present the results of technological progress as the effects of investment in human capital.

The importance and specific character of the workers’ social skills during the reindustrialization period is also examined in the well-known works by D. Demong [33], Y. Liu and D. Grusky [34]. These authors established the fact that professionals’ employment indexes and level of wages increased faster since 2010 in the branches that require the most developed social skills and high-level cognitive skills than in other branches.
Reviewing the growth of the human capital level inside the human-oriented manufacturing as a practical task is impossible without determining of the valuation method for this level. The opinion the authors share is that the appropriate method of valuation should be based on the informational cost theory by V. Valtukh [35]. Basing on this theory authors consider the personnel of the human-oriented manufacturing as an aggregate of the thesaurus information owners. The volume and quality of the information determines an economic value of any employee’s professional quality for the production system.

To determine quantities of the materialized in the labor force information the hierarchy of this resource’s qualification complexity should be taken into account. To solve the real-world problems in this field the qualification category indexes g are to be used, g ∈ L, L here is the aggregate of economic resources that affects human’s functioning as a part of human-oriented production system.

Basing on the definition “qualification hierarchy” to determine a volume of unit information that is materialized by the employees of g category, researcher is to use a cumulative probability index for the set of the employees of the category. Each of the sets should include all employees that are qualified enough to do the examined kind of work (including workers with higher qualification levels). Presenting a cumulative probability index as q^g_i, it’s possible to establish the following: if all q^g_i > 0, then correlation between different q^g_i (q^g_i indexes for different g) are determined as correlation between cumulative quantity indexes of the said employees sets.

Presented here labor force hierarchy conforms to the ideas of Shannon’s model (each state of g in the system is preceded by another state g – 1) [36]. So the previous states in the system don’t “break up” into the posterior states, but the posterior state is being “picked out” from a number of previous ones:

\[ q^1_i > q^2_i > K > q^L_i; \]

(1)

valuation of the cumulative probabilities of the higher-leveled qualification sets in the human-oriented production system gives a possibility to determine an index of its human capital’s increasing.

To solve an applied problem of increasing a social capital level of the human-oriented manufacturing, a high confidence between the people that create and use the system should be gathered. In other hand, the possibility of the people’s opportunistic behavior should be minimized.

The highest possibility of the opportunistic behavior in the human-oriented manufacturing takes place as an attribute of relations between the developers and the operators that work together with the same human-oriented production systems. They often give to each other an inadequate information about production system’s and product’s or service’s parameters during communication. This situation is known as “the informational asymmetry” [37]. It’s characterized with high levels of quantitative and value uncertainty.

According to J. Hirshleifer [38], the appearance of quantitative uncertainty should be determined as a basic reason for opportunistic behavior. It’s a problem of greater concern than value uncertainty, because the qualitative characteristics of production system or of the product (service) are multidimensional. Some of these characteristics, or some of their aspects may be immeasurable.

Possibilities for opportunistic behavior may be decreased greatly if the valuation of projects is based on using of the high-quality instruments. The instruments should give a possibility to quantify the qualitative characteristics of any production system. The valuation should be also an integral process that gives a possibility to compare the different versions of project with each other, and also compare their special parameters.

To solve the management problems that exist during making a decision of what technological variant is optimal, it’s possible to use methodologies and instruments of the natural science and engineering. One of these instruments is bringing the analyzed project into a correlation with one or another technological paradigm [39], [40].

The level of human-oriented manufacturing system’s conditions approximating to the optimum condition may be presented as a level of its entropy. Decreasing of the entropy level means that the human-oriented manufacturing system’s conditions become closer to the optimum. It’s possible to use this dependence because during the development and analyzing of the different versions of the construct the number of the possible (potential) versions to choose the optimum construct of them decreases. Each of the versions is a step to the optimum.

It’s possible to evaluate the human-oriented manufacturing system’s entropy level using the Shannon’s formula [36]:

\[ H = c \left( p_1 \ln \frac{1}{p_1} + p_2 \ln \frac{1}{p_2} + \ldots + p_n \ln \frac{1}{p_n} \right), \]

(2)

The used measurands are: H — entropy of the construct; p_1, ..., p_n — state probabilities of the construct’s elements; c — the constant.

It’s to be taken into account that during the analysis of the human-oriented manufacturing system’s elements and the combinations of them the authors examine only the material components of the system and structure of these components. The non-material components (such as databases, thesaurus of the certain employees and other informational resources, used in the “classical” Shannon’s formula) shouldn’t be examined.

As the most applicable in the analyzed situation the authors are going to use the conditional entropy index, derived by A. Renyi [41]. The essence of the presented approach is the following.

Let B is a randomly chosen version of the construct, and the probability of the choice is positive; ξ is a random variable that possesses the values x_1, x_2, ..., x_n. The authors denote by A\_ξ the derivative of B, a version of the system which’s ξ = x_k (k = 1, 2, ..., N). Then basing on the definition, authors determine the conditional entropy of ξ under the condition B as an entropy of the random variable ξ, calculated on the base of the conditional probabilities’ distribution. It’s taken that that the system’s version B is created. So, let’s derive the equation:

\[ H_{\cdot B}(\xi) = \sum P(\cdot | B) \log_2 \frac{1}{P(\cdot | B)} \]

(3)

\[ P(\cdot | B) \] is a conditional probability of the version A\_ξ under the condition B (B is taken as the initial version), so the equality is the following.

\[ P(\cdot | B) = \frac{P(\cdot | B)}{P(B)} \]

(4)

Let η is another version of the construct, which’s characters possess the values y_1, y_2, ..., y_m, and B is a version η = y_i (i = 1, 2, ..., M). Then the conditional entropy of ξ when the version η is created is H_B(ξ), that is definitely similar to the expectation value of H_B(ξ).

\[ H_{\eta}(\xi) = \sum P(B_j) H_{B_j}(\xi) = \sum \sum P(A_k | B_j) \log_2 \frac{P(B_j)}{P(A_k | B_j)} \]

(5)
In the analyzed situation it’s to be taken into account the entropy of random variable $\xi$ (the uncertainty of $\xi$ value), and how it decreases during the examining of the randomly chosen version of the human-oriented manufacturing system $\eta$. A value of the entropy quantity the authors designate as $I(\xi, \eta)$. It is a quantity of information about randomly chosen value $\xi$ that’s possible to get during the examining of randomly chosen version of construct $\eta$.

$$I(\xi, \eta) = H(\xi) - H(\eta) = \sum P(A_k) \log_2 \frac{1}{P(A_k)} - \sum \sum P(A_k B_j) \log_2 \frac{P(B_j)}{P(A_k B_j)}$$  \hspace{1cm} (6)

Then the identity is to be used:

$$\sum_j P(A_k B_j) = P(A_k)$$  \hspace{1cm} (7)

It’s possible to use it because the versions $A_1 B_1$, $A_2 B_2$, ..., $A_i B_j$, are mutually exclusive, and if the construct version $A_k$, is created, creation of any other version of $A_i B_j$ is possible too.

Basing on the above the authors can label any problem that exists during the development of the human-oriented manufacturing system as a result of shortage of the information about construct’s elements. So, using the information about cost characteristics of the human-oriented manufacturing system is a possible way to solve the problem.

5 CONCLUSION

Nowadays features of working out technologies and hardware design for human-oriented manufacturing are inseparably linked with the reindustrialization processes. These processes are spread all over the modern world. But in the countries with different social and economic systems reindustrialization processes affect working out technologies and hardware design for human-oriented manufacturing in different ways.

In the reindustrialization period development of human-oriented manufacturing systems greatly depends on social aspects of the socio-economic environment. In the earlier periods, such as the Industrial Age, or reindustrialization period the greater attention was paid to the ergonomic features of the created human-oriented manufacturing systems.

Efficiency of the new human-oriented manufacturing may be increased greatly when its project combines harmonically the human creativity and empirical methodology that gives a possibility to valuate technical and economic decisions made by human, and use the results of valuation to optimize the work processes and results. Using this methodology makes the quality of decision-making higher and decreases the possibility of the participants’ opportunistic behavior during the development or exploitation of the human-oriented manufacturing system.

It’s presented an original approach to organizing of the interaction between different participants of the engineering processes and activities during the development of the human-oriented manufacturing. Using of this approach gives a possibility to harmonize the interactions between these participants and to decrease the possibility of opportunistic behavior.

The most important elements of working out technologies and hardware design for human-oriented manufacturing are two process management activities: managing of the project development, and keeping up a high level of the system’s Progressiveness (the closer this level to optimum index the better).

In the article is presented and examined an original way of managing the project development processes basing on the valuation of the developed human-oriented manufacturing’s conditional entropy level. This level greatly depends on the human’s participation in the project. It’s presented a way of valuation and correction of this level. To do this work, it’s suggested to valuate the human-oriented manufacturing project’s Progressiveness level by assigning it to one or another technological paradigm.

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