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RESEARCH ARTICLE

ALTERNATIVE OF INNOVATIVE AGING IN SME$_S$ BY LOWERING THE PRODUCT COST PRICE.

Siyka D. Demirova.
Associate Professor, PhD, Department of Industrial Management, Technical University of Varna, Bulgaria.

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Abstract

The purpose of this article is to analyze the harmful effects of rapid innovation aging in small and medium-sized enterprises (SMEs), and on this basis to propose alternatives for its partial or total removal. However, this must also be related to the reduction in the cost of manufactured industrial products. One way to solve this problem, especially for SMEs, is to apply the "approach or philosophy" of open innovation and to seek alternatives to rapid innovation aging.

Introduction:-

Industrial companies are those who act as organizers and implementers of the activity related to the production of industrial products and interested in removing and regulating innovation aging. However, new entities are emerging worldwide, the decisions and behavior of which influence the development of these processes. These are international organizations, as well as multinational companies, regional organizations, industrial investors, etc., who are actively involved in the search for alternative solutions to remove the rapidly emerging innovation aging. On the other hand, the sustainable trends of globalization of the economy determine the accelerated introduction of innovative solutions, consisting of new technologies and electronization of the production processes. This solves a wide range of tasks related to increasing productivity, quality of production, sustainability and flexibility of the production process, and reducing the cycle from idea origin to product marketing (Damyanov, 2002). What characterizes the quality of application of new technological solutions and determines their functionality and marginal complexity is the system that is used both for communication and coordination between the different industrial levels and for their faster implementation in practice. Sustainable growth and global competition require the need to use economic impacts to awaken the productive growth, effectively balanced between the needs of society and productivity. This means investing resources into high-performance technologies (production and information) that provide solutions for global innovation saturation of processes and activities in SMEs as well (Damyanov and Rachev, 2014).

On the other hand, the ever-increasing demands of consumers as well as the increasing competitive pressure on world markets predetermine the need for a radically different approach to these problems, and in particular to innovation aging and the whole production process (Nedyalkov, 2011, Dell'era and Verganti, 2009).

A global trend is that manufactured goods are becoming increasingly complicated both in terms of their internal structure and the consumer and functional requirements they have to satisfy. To these should be added the growing need for a quick solution to complex consumer problems, which are becoming more and more difficult to solve through conventional means. There is a need for global innovation development and a solution to this problem. And

Corresponding Author:- Siyka D. Demirova.
Address:- Associate Professor, PhD, Department of Industrial Management, Technical University of Varna, Bulgaria.

one way to solve these problems, especially for SMEs, is to apply the "approach or philosophy" of open innovation and to seek alternatives to rapid innovation aging. This alternative should also be linked to creating conditions to reduce the cost of production.

Literature Review:-

Impact of innovation aging on business performance of small and medium enterprises

Sustainable growth and global competition require the use of economic impacts to awaken production growth that is effectively balanced between the needs of society and productivity. This means investing resources into high-performance technologies (production and information) that provide solutions for global innovation saturation of processes and activities.

An especially important point in this direction is the correct determination of the degree of innovative aging. The aim is to identify the impact of innovation on the technical, economic and social results of industrial activity. Proper assessment of their impact on the scale and timing of innovative aging is of the utmost importance to timely remove the negative effects of their impact. Influence has two forms of innovative aging.

The first form of innovative aging is an inevitable consequence of innovation in technology and technology in the manufacturing industries. The growth in labor productivity in these industries and the way materials and labor are used to produce produce an annual change in the cost of production. The rate of this decline depends on the increase in the productivity of public work and the growth of the national income, seen in terms of its distribution for accumulation and consumption (Cordero, 1991).

The decrease in the cost of production means as a result of cheaper reproduction is the first form of innovative aging. It is characterized by a partial devaluation of the working tools of labor and derives from the sphere of their production, which covers all means of labor without affecting their consumer value. Therefore, there is no need to reassess them by way of the periodic revaluation of the main production funds at their recoverable value, reflecting the current production conditions. (Woschke and Haase, 2016).

The second form of innovative aging arises under the impact of innovative solutions expressed in new, more modern, more productive and better-engineered and built-in machines than new ones. In these cases, the efficiency of the use of old machines and equipment will be significantly lower, and they will devalue themselves to a certain extent. The effect of using such a technique will be reduced as the magnitude of this decrease will depend on the power of the manifestation of the factors characterizing their innovative aging. The second form of innovative aging contains some peculiarities that most fully reveal its essence and the economic consequences of its influence on the elements of production. The main feature is that it causes a partial or complete depreciation of the labor resources and their consumer value, which results in the need to replace the technically outdated equipment with a new one before the expiry of its physical wear and tear. The economic feasibility of such a substitution is not determined by the very fact of the emergence of new machines of similar technological purpose but by the degree of the innovative devaluation of the machines and equipment in operation and the level of reduction in the cost-effectiveness of their continued use. However, it should be borne in mind that the loss of consumer value and the need to replace machinery is conditioned by a number of factors reflecting the specific directions of the impact of innovation development. (Sørensen and Stuart, 1999, Tushman and Anderson, 1986).

Taking into account these factors, which characterize the qualitative side of innovation development, reveals not only the mechanism of its impact on performance indicators but also its impact on various aspects of the production process.

From the above it can be concluded that the influence of the innovation development is globalizing, resulting in innovative aging of the technique and lagging at the level of the exploited technologies from the modern ones. The further use of innovative outdated technology and technological processes leads to certain losses, the amount of which will depend on the extent of this lag.(Damyanov, 2009).

Analysis and Interpretation:-

1.Trends in changing product and process parameters under the influence of innovative aging. At the current stage of technological development, innovative aging has a predominance over physical. That is why a particularly important point in this direction is the correct determination of the degree of innovative aging in order to determine

the impact of innovation on the technical, economic and social results of industrial activity. Assessing their impact on the scale and timing of innovative aging is crucial to timely remedy the negative effects of their impact. In addition, the impact of innovation development is globalizing, resulting in innovative aging techniques and lagging behind-the-scenes technologies. The further use of innovative outdated technology and technological processes leads to certain losses, the amount of which will depend on the extent of this lag (Gravier and Swartz, 2009).

Technological development and not just its consequences, manifested in the form of innovative aging of products and processes, lead to producers' attitude towards searching for ways and means of perfecting and changing their parameters. The trend of changing the parameters of innovative products and processes as a result of their rapid innovative aging already forms a new alternative concept for innovation development. It also puts new requirements both on the consumer nature of innovative products and on the methods, approaches and ways of their production. (Maniyka et al., 2012).

The main directions that provide an effective way out of the constraints imposed by rapid innovation aging in creating competitive innovative products are being actively applied by many companies in automotive and electronics. This new approach, adopted quickly by the industrial companies, already shows its advantages, Figure1, in the following directions:

- applying the modular principle of constructing and producing innovative products;
- design and production of identical modules for different technological purposes;
- design and production of innovative products with the highest possible reliability and short service life;
- consider the design and production cycle as a continuous process and use the methods of competitive engineering, simulation, virtual presentation, etc. with the aim of shortening the cycle as much as possible;
- as short a cycle as possible from an idea to an innovative product.

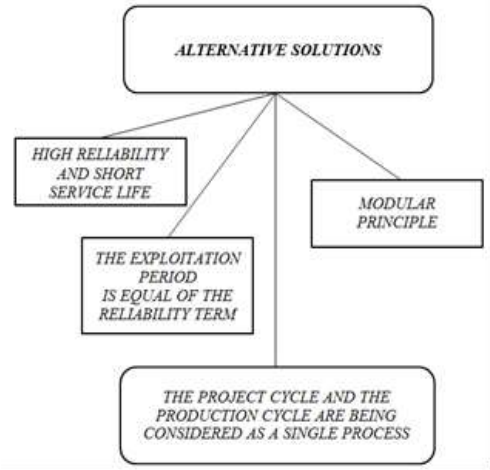

Figure 1:- Alternative solutions

Contemporary production development imposes conditions that companies must comply with. This stems both from the technological attitude and from the strong impact of consumer interest (Coviello and Joseph, 2012). That is why more and more small and medium-sized companies are beginning to apply flexible technological and organizational forms of behavior to the surrounding industrial and market world, which are expressed in the following:

- form their vision of market and competition, depending on the innovative development of modern industry;
- adopt their economic policy towards the common industrial policy on a national and global scale;
- strive to tackle innovation issues and produce highly innovative products;
- apply flexible production forms of technology;
- coordinate their activities with flexible information technology;
- adhere to the market with flexible forms of production and product realization;
- locate their production where it is most profitable and the effect of realization of innovative solutions is greatest.

2. Factors forming the cost of industrial products produced by SMEs

The factors that influence the formation of the cost of industrial products can be divided into two types: internal and external. External are markets, competitors, suppliers and innovation aging. It should be noted that at the current stage of technological development, innovation obsolescence has a predominant importance over physical. Therefore, a particularly important point in this direction is the correct definition of the age of innovation aging in order to determine its impact on the technical, economic and social results of the industrial activity, i.e. production of products. Proper assessment of their impact on the scale and timing of innovation aging is of the utmost importance to timely remove the negative effects of their impact. Internal factors are the technological, organizational and operational (production) factors. This is illustrated in Figure 2.

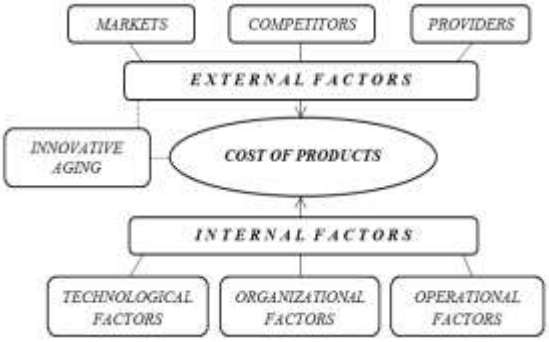

Figure 2:- Influence of external and internal factors on the cost of the product

Technical development also forms the company's policy as part of its corporate policy and is an integral part of the overall technical and economic development of the company. The strategic policy of an industrial firm is unthinkable without a well-developed, well-thought-out and rational policy of technological development. This policy actually forms the concept of the company's economic performance and is a key factor for its prosperity. Figure 3 shows the relative share of the influence of the internal factors (company policy) on the possibilities of decreasing the cost of the industrial products. It is proven that up to 75% is due to the technological factors on which construction, technology, etc. depend, and the remaining up to 25% depend on the organizational and production factors. Their ratio varies in almost equal percentages or shares (Commission Staff, 2017).

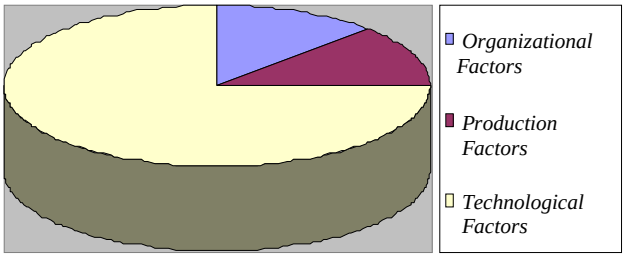

Figure 3:- *Ratio of organizational, production and technological factors*

3. Opportunities to reduce the cost of industrial products and to extend the duration of innovative aging

The cost of industrial products is formed by a set of elements (costs), each of which depends on the degree of impact of both external and internal factors. In summary, this result can be expressed as follows:

$$C = \left(M + K + T + P_p\right)\left(1 + \frac{H_p}{100}\right) \quad (1)$$

Where:
C – Cost price;
M – Materials (basic and auxiliary);
K – Modules (finished elements, details, assemblies, etc.);
T – Wages (salaries, etc.);

P_p – Manufacturing costs;
H_p – Non-production costs.

Proven trends in material economy, direct labor, production and non-production costs are not the subject of this report. The peculiarities of the study are focused on the formation of economics from the modular performance (K) and the relative economics of labor resulting from the application of the modular principle, and it is due to the following external manifestations given in Figure 4.

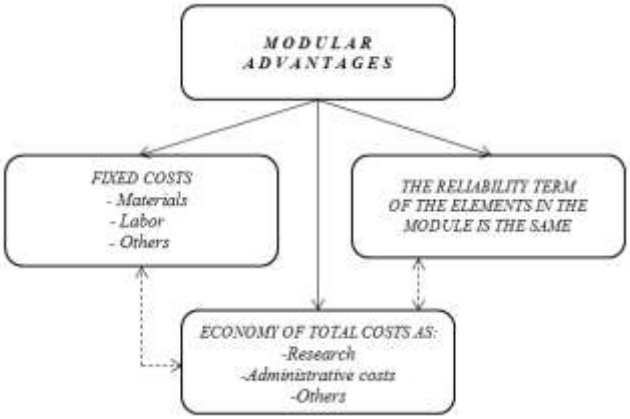

Figure 4:- Decrease of cost in modular execution

First: It is important to take into account trends in product and process parameters changing under the influence of technical development. As has already been mentioned, at the current stage of technological development, innovation obsolescence has a predominance over physical. Therefore, it is particularly important in this respect to properly determine the impact of innovation aging on the technical and economic performance of production, and in particular on cost. Assessing the impact of innovation aging is crucial to timely remedy the negative impact of its impact. In addition, the impact of innovation aging is globalizing, resulting in innovative aging of technology and lagging at the level of the technologies put into use today. The further use of innovative outdated technology and technological processes leads to certain losses, the amount of which depends on the extent of this lag.

The consequences, manifested in the form of innovative aging of products and processes, lead to producers' attitude towards searching for ways and means of improving and changing their parameters. This tendency to change the parameters of innovative products and processes as a result of the manifestation of technical regulations and in particular their rapid innovation aging forms a new alternative concept of technological development. It also puts new requirements both on the consumer nature of the products and on the methods, approaches and ways of their production and cost.

The main directions, dictating the effective outcome of the imposed restrictions due to the rapid innovation aging in the creation of competitive innovative products, are actively applied by many companies, showing their advantages in the following directions: applying the modular principle of construction and production Of innovative products; Design and production of modules with the same parameters but adapted (standardized) for different technological units; Design and manufacture of industrial products with the highest possible reliability and short service life; Consideration of the design and production cycle as continuous flow and use of simulation methods, virtual presentation, etc., in order to shorten the cycle as much as possible.

Second: Technological developments and rapidly emerging innovation aging impose conditions that companies must comply with. This stems both from the technological attitude and from the strong impact of consumer interest. That is why more and more companies are starting to apply flexible technological, organizational and economic forms of behavior to the surrounding industrial and market world. This means that a global technology policy is beginning to emerge. This policy is increasingly adapting to the global industrial behavior of industrial firms as a resource for their future development (Popova, 2016). It is consistent with both their technological development and the costs (cost) of manufacturing industrial products.

The cost of modular application is lower due to the fact that in their production the principles of mass production are used, which lead to lower production costs. In the end, we have a single consumption of modules produced at a lower cost of mass principle. The modular principle defines the following dependence, expressed by the costs that form the cost of the industrial product:

$$S_k = S_n + \frac{S_a}{N_n} \quad (2)$$

where:
S_k – Module cost;
S_n – Direct costs.
S_a – Total Company Expenses;
N_n – Order (production program).

4. Summary indicators to assess the cost of industrial products from alternative solutions

As a summary of the cost estimates of industrial products, taking into account these new trends, as an alternative to innovative aging, the following are accepted:

$$Go = Go_1 + Go_2 + Go_3 + ...Go_n \quad (3)$$

Go – Total material consumption (weight);
Go_1, Go_2, Go_3, ... Go_n – Various types of metal and non-metallic materials.

$$K_m = \frac{G_r}{G_o} \quad (4)$$ – The use rate of the material;

G_r - Net weight of the finished product.

$$T_o = t_z + t_b + t_m + t_{sp} \quad (5)$$

T_0 – All labor;
t_z – Labor input in preparatory work;
t_b – Labor input in processing;
t_m – Work done in assembly;
t_{sp}– labor input in auxiliary activities (painting, packaging, storage, etc.).

$$K = Md_1 + Md_2 + Md_3 + ...Md_n \quad (6)$$

where:
Md_1, Md_2, Md_3, ….. Md_n – Modules.
In this case, it should be borne in mind that the coefficients of unification (Ku) and standardization (Kc) should be equal to 100%.

5.Business environment and innovation aging

The large user of alternative solutions is Small and Medium Sized Enterprises. In the context of accelerating globalization and increased market competition, the market and consumption place small businesses at the heart of fundamental issues related to its competitive advantages, including company quality, development, innovation and others. This puts small and medium-sized businesses in charge of addressing clearly defined goals related to profits, innovation, clustering, quality standards, environmental sustainability and energy efficiency. Improving management and marketing strategies, improving social services, and paying close attention to human resources is also one of the priorities for future development. This will require reorientation of firms from globally-priced manufacturing industries with low added value to niche niches based on specific competitive advantages and innovative products with higher added value. Long-lasting company flexibility is required, in line with rapidly changing market conditions and a successful search for new niche markets and partners.

In order to answer these questions, companies should clearly formulate their goals of profit, corporate growth, social contributions, quality of working conditions, and environmental protection. Strategic management of small and medium-sized businesses should address the issues: product quality, scope of business, production process range, layout structure, expanding the market with flexibility, continuous innovation development and application of alternatives to rapid innovation aging.

Small and medium-sized businesses are increasingly becoming the main pillar of national economic development, creating a growing added value based on innovation (closed and open). SMEs play a major role in the country's economy. Recent data show that they account for 98.9% of all enterprises in Bulgaria. In addition, they provide over 75% of turnover, 65% of value added and 55% of exports.

More than 99% of SMEs are private and less than 1% are public. The internationalization of SMEs coincides with that of the EU, accounting for between 25% and 45% of exports (Commission Staff Working Document, 2017). Bulgarian SMEs strive for new market niches, cost savings, innovation, affordable access to finance, etc. They are playing an increasingly important role, both in terms of conquering new niche markets and in terms of greater participation in social life, with more than 60% of jobs being provided.

6. Trends of development and impact

Another manifestation of this development is that the relative share of specific technological, organizational and economic decisions in a product becomes more and more. The share of modules of a universal technological nature incorporated in industrial products is relatively increasing. By contrast, the number of innovative technological solutions for a variety of technological needs is growing, but with a universal purpose. This new technological development together with the new production concepts and the global electronic environment define the integration essence of modern industry and the production of industrial products by SMEs.

With the expansion of global impacts on all spheres of economic life, it is necessary to create prerequisites and conditions in the companies to influence the negative consequences of global innovation development. These impacts in general can be grouped into the following more important directions:

1. Expansion of the number of companies servicing the big industry, including the tourism industry, through the improvement of the specialization and creation of specialized companies only for a separate product using the services of R&D centers, institutes, etc. For this purpose, the development of innovation is sought through cluster building and the creation of specialized conditions to be used as an alternative to the negative impacts of global processes.
2. Competitive struggle between small businesses will become more and more, as a result of which alternative survival solutions are noticed as such, introduction of a quality management system, strict specialization on the production of a particular product, use of ready-made innovative Solutions from other companies, increasing the rate of use of the benefits of open innovation, etc.

In Figure 5 schematically illustrates the impact of globalization.

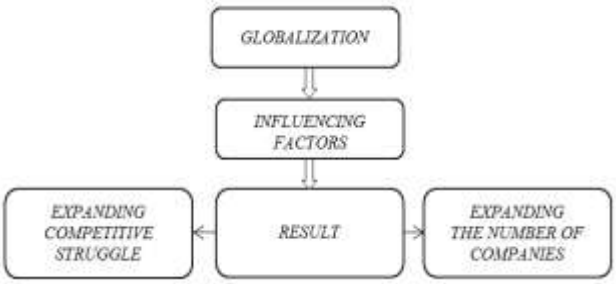

Figure 5:- Alternatives to global impacts

Small and Medium Business and the Pressure of International Competition

Small and medium-sized businesses are most exposed to the pressure of international competition. On the other hand, they are the most flexible in terms of avoiding the impact of this pressure. This flexibility is primarily due to their simplified organization structure and production process and form of governance. They also see the fact that staff are qualified with a wide range of activities. Most companies are targeting a larger share of their production to be pre-insured for the need of other companies. These are products or products intended only for other companies and not for a large consumer market, such as the production of filters, straps, etc.

Trends in the impact of external and internal factors

Global trends in manufacturing development, including alternatives to rapid innovation aging in SMEs, have been constantly changing in the direction of improving their business as structural forms and management methods. These trends are mainly due to the following major factors and impacts:

- Extending global impacts
- Increase in competitive pressure
- Impact of the electronic environment on a global scale
- Ecology

As a result, the following trends have emerged:

1. Improvement of the organizational forms, specialized small enterprises and virtual management of the small enterprise
2. Raise the level of the electronic environment in the small enterprise to the level of the external impact of the electronic environment.

This means that small businesses need to build such a management information system that can communicate with the external electronic environment. Electronic equipment and software products should define such a technologically new one, allowing for fast and effective communication with the surrounding objects (banks, tax and other companies).

3. The small enterprise encourages the generation of ideas leading to the creation of innovative products.
4. Using the advantage of open innovation.
5. Ecology.

Conclusion:-

The following conclusions can be drawn from everything outlined here:

1. An analytical study of innovation aging in SMEs and its impact on their economic indicators was made.
2. Impacting internal and external factors on the rapid innovation aging of the products produced by SMEs are identified.
3. Summarized indicators for estimating the cost of industrial products from alternative solutions are presented.
4. Offered an alternative to innovation aging direction decrease the cost of industrial products.
5. This downward alternative leads to longer-lasting competitiveness of industrial products on the market.

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