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## INNOVATION, INNOVATIVENESS AND GENDER - APPROACHING INNOVATIVE GENDER

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### Abstract

*This paper deals with the attempt to search for the sources of creativity in the broad sense in solving problems. These creative solutions become innovations. The ability to develop innovation depends on the multi-dimensional predispositions to solve problems – those found in people, inspired by the market, organised or spontaneous, as well as facilitated or hampered by the state. Yet, the aforementioned factors should be supplemented with one more – gender. In the chapter attention is paid to the multi-dimensional differences stemming from gender, which should be perceived as a positive element, because they are the source of synergy resulting from collaboration among research or business teams in the process of innovation. The chapter introduces the concept of 'innovative gender' and its institutional framework. The methodological inspiration is the model known in the literature as the Innovation Genome, the conceptualization of which constitutes a major part of the study.*

**Keywords:** institutions, creativity, innovation, innovativeness, innovative gender, innovative genome, integrated gender innovation genome

**JEL classification:** B52, B54, O31

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### 1. INTRODUCTION

Despite the diagnosis that the European Union is experiencing a triple crisis: of substance, of trust, and of power, resulting in institutional weakening of its position as an innovator on the global scene, the growing predominance of procedure-based thinking, the expansion of all-encompassing controls limiting freedom of choice, member states keep creating subsequent programmes and strategies for an intensification in research and innovation development. This paper deals with the search for the sources of creativity in the broad sense in solving various problems, wherever traditional approaches have proved ineffective. These creative solutions – unconventional and practical in application – became

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innovations. The ability to develop innovation depends on the multi-dimensional predispositions to solve problems – those found in people, inspired by the market, organised or spontaneous, as well as facilitated or hampered by state policy in individual countries or regions. Yet, it might be expected that the aforementioned factors should be supplemented with one more – gender.

Social systems are dynamic, ever-developing entities, in which the boundaries for human behaviour are set by the institutional framework. The economy, like society, represents a complex of institutions, ranging from the smallest, such as the family, to the largest and most comprehensive, namely the state. People behave in the way they are expected to, and this is very visible in the gender relations. This behaviour may cause significant limitations, leading to disadvantages for individuals, as well as societies and economies. Transformations introduced by the state in the economy may cause desired transformations in society, called institutional changes. Institutional change is understood as the adaptation of habits of thought to changing circumstances. Institutional change may promote creative and innovative behaviour from women and men, leading to economic progress.

Attention is paid here to the multi-dimensional differences stemming from gender, which should be perceived as a wholly positive element, because they are the source of synergy resulting from collaboration among research or business teams in the process of innovation. So, this chapter introduces the concept of 'innovative gender' and its institutional framework. The methodological inspiration is the model known in the literature as the Innovation Genome, the conceptualization of which constitutes a major part of the study. Thus 'innovative gender' is presented on the 'innovation genome', in which we elaborate five matrices filled with gender-sensitive information. The innovative genome allows us to highlight the gender dimensions of innovativeness and creativity<sup>1</sup>.

## **2. GENDER – INSTITUTIONAL APPROACH**

### **2.1. Institutions and institutionalism**

Economic activity takes place within an institutional framework, and the economic system is a part of the greater social system in which it is embedded (Gruchy, 1987). Social systems are dynamic, ever-developing entities, and all social activities occur in both historical time and an environment of uncertainty regarding the future. According to Wilber and Harrison (1978, p. 71): 'social reality is seen as more than a specified set of relations; it is the process of change inherent in a set of social institutions which we call an economic system'.

The rules that define economic activity may be referred to as institutions. Institutions are rules and ways of behaviour known to each member of the society because of their everyday use; collective actions that control individual's activities; widely recognised standard social norms; and ways of thinking. According to Hamilton (1932) the institution is a cluster of social usages, designating a way of thought or action of some prevalence and permanence, which is embedded in the habit of a group or people's customs. Institutions are both 'subjective' ideas in the heads of agents and 'objective' structures faced by them (Hodgson, 1998, p. 181). Tony Lawson wrote: 'Individuals are born into society and exist and develop through it in a way such that their very capacities and personalities, including psychological and other dispositions, are to an extent moulded, shaped, formed and continually transformed by the societal conditions' (2003, pp. 204-205). In this sense,

institutions are not only boundaries, but they function to shape the very essence of social life (Hodgson, 1988). It is the diversity of institutional situations that is the principal source of differences in individual behaviour (Chavance, 2009, p. 17) but also differences in the conditions describing the position of particular countries and economies.

Culture represents the aggregation of diverse institutions, each of which fixes a type of behaviour and outlines a tolerance zone for an activity or complementary activities (Chavance, 2009, p. 18). An institution is made up of people performing activities according to a set of rules that are justified by a set of values, beliefs and meanings. As people perform their activities according to the rules, they internalize values, beliefs, and meanings that justify the rules (Dugger, 1996, p. 25). Powers and constraints associated with institutional structures can encourage changes in thought and behaviour (Hodgson, 2003, p. 166).

## 2.2. The state and institutional change

The state holds a key position among institutions since state actions are based on normative representations of the 'common good' for given societies - '[t]he state is formally assigned the role of creating the conditions that maximize the possibility of attaining a general common good' (Storper, 2000, p. 89). The influence of the state on society, as well as the national economy, shapes institutions that systematically and constantly regulate the behaviour of individuals and social groups in formal and informal ways (Wilkin, 1999). The ability of the state to influence or even create institutions has a dominant meaning in contemporary societies, because it is the state that creates the basic frames for the institutional functioning of markets. The state may play an active role in the economy by helping to expand individual liberty and shape community preferences and social institutions.

Institutional economists favour activist government using the tools of macroeconomic policy for this purpose. Such activity involves more than a simple acceptance of the need for government interventions to correct the failures of market capitalism (Peterson, 1994). The state cannot be neutral, because its pretended neutrality allows existing forms of inequality to remain legitimate (Dugger, 1994, p. 17). Nevertheless, institutionalists stress that state action can both restrain and expand individual liberty; and recognise that more government activity does not ensure an improved economy (Whalen, 1996).

Changes introduced by the state in the economy may influence social relations and lead to the transformations of other institutions. However, the process of social changes not purely mechanical. Rather it is a product of human action, which is shaped and limited by the society in which it has its roots (Wilber and Harrison, 1978, p. 71). Transformations, including those introduced by the state, may lead to institutional changes. Institutional change means that the community, in its economic dealings with the environment, undergoes a process of adaptation to new conditions. According to Rutherford (1998, p. 468) this is an adaptation of habits of thought to changing circumstances. Therefore changes in the material environment lead to changes in habits of thought and institutions (Kologlugil, 2012, p. 847). Thus institutional change refers to some changes in the underlying rules that structure social interactions (McMaster, 2008, p. 897). It necessitates some intervening phenomena which interfere with what would otherwise be institutional continuity (Dolfsma and Verburg, 2008, p. 1037).

### 2.3. Gender and gender inequality

Institutional economics offers a broad perspective, which enables gender to be brought forward while analysing economic relations. The institutionalist conception of society is holistic in nature; in other words social reality is viewed as a unified whole. *'Institutionalism's holistic theories are rooted in the belief that the social whole is not only greater than the sum of its parts but that the parts are so related that their functioning is conditioned by their interrelations'* (Wilber and Harrison, 1978, p. 73). Therefore institutional analysis cannot begin with the world neatly divided into 'economic' and 'noneconomic' realms. Gender is a fundamental organising principle of institutions (Jacobsen, 2007, p. 92), and it has to be taken into account while researching economic questions. *Gender* is a cultural superstructure on biological sex, a complex of attributes and behaviours expected of women and men perceived as useful in their social functioning, which includes everything that is variable and socially determined. The particularly important aspects of the concept of gender that require emphasis are:

- *gender* is the social meanings attributed to biological differences between the sexes;
- social roles assigned to women and men vary over time;
- *gender* is a phenomenon deeply rooted in social institutions and social mentality, often unconsciously, and is thus not subject to any reflection;
- *gender* differences contain a hierarchy, because *gender* is a relational term, referring to the interaction of male and female roles, studying one sex entails the need to also study the other;
- *gender* determines the direction of education and socialization, sets social standards, and contributes to the strengthening of stereotypes and prejudices leading to discrimination;
- to some extent *gender* determines the life choices regarding education, occupation, and interests, which may impede or prevent the realization of the individual's potential.

The study adopts the following definition: *Gender is a time-variable social phenomenon, constituting the superstructure of biological sex, which is reduced to a set of traits, behaviours, attitudes, roles and attributes assigned by the wider culture to one sex and expected by society, respectively from a woman or a man, as well as the closely related relationships between them, which includes a hierarchy.*

In modern societies the existing *gender* order assigns different roles to men and women leading to inequality between them. Women are understood in the light of the experiences of men, not of their own (Sherman, 1996, p. 48). Men are the centre of existence and women are pushed out onto the margin, which makes women almost invisible in the world of men (Dugger, 1994, p. 8). As de Beauvoir (1989, c1952, pp. xxii-xxiii) puts it, men are subjects, the absolute, and women are the others. The state also influences the position of women in society and the economy. As Walby (1997, p. 118) suggests that *gender* relations are not only shaped by interactions between individuals, or individuals and the market. She points to the significance of political and policy issues in the determination of *gender* relations. Economic policies are often perceived as *gender*-neutral; nevertheless, they always have an impact on *gender*. It is no different in the case of efforts to support innovative activity. If *gender* is not sufficiently exploited in the context of innovativeness it may hamper *gender* equality, but also limit social and economic progress.

### 3. INNOVATION, CREATIVITY, INNOVATIVENESS

#### 3.1. Innovation, innovativeness - the driving force of development

The literature offers many varied definitions of innovation as well as a large number of models developed over the last three decades of the 20<sup>th</sup> century, and yet the focus is on the search for changes in the economy and society which constitute innovation where gender may be of particular importance. The definitions of innovation postulated by many researchers emphasise that ‘innovation is a process expressed by the transformation of existing possibilities into new ideas and finding practical applications for them’. It is – to put it succinctly – ‘the introduction into general use of new products, processes, and ways of doing things’ (Allen, 1966, p. 7). According to this group of definitions, ‘Industrial innovation includes the technical design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product or process’ (Freeman, 1982), or ‘Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service’ (Drucker, 1985). ‘Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things’ (Porter, 1990). ‘Innovation is carrying new ideas out into practice (Fagerberg, 2006); it is the ‘conversion of an idea into an outcome’ (Satchell, 1998, pp. 33-34). And there is an indication that ‘[...] innovation does not necessarily imply the commercialisation of only a major advance in the technological state of the art (a radical innovation) but it includes also the utilisation of even small scale changes in technological know-how (an improvement or incremental innovation) [...]’ (Rotwell and Gardiner, 1985, p. 168), since, in practice, not all innovations are based on inventions. For L. Soete ‘innovation is about creating value out of ideas, concepts’ (Soete, 2006), when the ideas are brought to the market in the form of new products, better designs, better manufacture or distribution, and when it all takes place within the institutional environment of the ‘national innovation system’. In this context, as is the case with Freeman (Freeman and Soete, 1997), who decided to incorporate the concept of a national innovation system into the theory of economics, the scale of elements describing the concept of innovation is considerably broadened to include qualitative changes in the development of innovation, such as changes in the system of education, science, technique and technology, intensity of collaboration among the participants of the process of innovation, or searching for the reasons for these changes which in various ways activate humans (men and women) or have a detrimental effect on their behaviours. ‘Innovation is at the centre of practically all the phenomena, difficulties and problems of economic life in capitalist society, as its essence is “building a new function of production”’ (Schumpeter, 1939, p. 87).

This special role in economic development assigned by J. Schumpeter to innovation activity of entrepreneurs has served for years as the basis for many researchers in their attempts to formulate a definition or a model based on his concept. It has also triggered a discussion on the importance of innovation in economic development, which is particularly emphasized in current EU policy (Europe 2020), both in its positive sense – as ensuring a leap in management efficiency growth – and negative – as a phenomenon capable of causing economic crises. A broad approach to innovation enables us to capture the areas where the importance of gender could be determined. Particularly important here is the sphere of entrepreneurship, with substantial output as regards the assessment of gender-specific

predispositions (Mazowia, 2013). The fact that innovation is often perceived as equivalent to something new or something modified is reflected in modern institutional definitions of the term (OECD, 2005). In the broad understanding, a reference to being 'new' as a basic feature of innovation is not always treated with objectivism. For instance, there is a view that '[...] an innovation refers to any good, service or idea that is perceived by someone as new' (Kotler, 1978, p. 224), or, just the opposite – 'the invention applied for the first time is called innovation' (Mansfield, 1968, p. 99). There is an ongoing dispute as to whether the feature of 'novelty' should be attributed to an entity, enterprise, economy, or a global market, or to manufacturers or consumers. There is a clash between radical definitions perceiving innovation as novelty from the perspective of the whole economy (Schmookler, 1966), and softer definitions where innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (OECD, 2005, pp. 46-47), abandoning the requirement that innovation must be something absolutely new and introduced for the first time on the global market. This approach, however, is far from common practice. In real life, these are the leaders of innovation that count in the world, and the rest are just 'followers'.

It seems that one of the more useful approaches to innovation – from the perspective of seeking sources for Innovative Gender – is that where there are two different scales of novelty – the one a consumer and of a producer (Hirsz and Peters, 1978, p. 9). Even general observation shows that women, to a considerably greater degree, base their choice of consumption patterns on taste, satisfaction, social benefits, or fashion; while men pay more attention to technical usefulness. The growing complexity of the production cycle leaves less and less room for *ad hoc* innovations emerging as sudden "miraculous" solutions. Therefore, nowadays, the essence of innovation should be sought rather in their permanent, systematic and consistent nature. A philosophy defining innovation by means of continuity and regularity of innovation activity should naturally be associated with providing enterprises and economies with unique resources generating not only innovations, but also competitive advantage. In this concept, falling within the scope of a resource-based approach to innovation, it is assumed that an enterprise is a set of inimitable and irreplaceable rare tangible (production and technology) resources and non-tangible resources (managerial knowledge, intellectual property rights, organisational culture) that affect an enterprise's results. However, in a very specific way, thanks to their resources, enterprises have a dynamic capability to integrate and re-configure internal and external competences in fast-changing environments, which enables them to create and implement innovations (Teece, 2007). Although the resource-based approach has its critics, the interesting conclusions from research on the impact of experience, competences, collaboration skills, and knowledge of employees on R&D activities as one of the measures of innovation activity remain valid. Innovation in an enterprise and an economy, as one of the most progressive factors of social and economic development, including the local perspective, depends on the condition, originality, and availability of resources. For innovation means creativity, establishing new social relations and motivating economic entities to engage in innovation activities expressed as the continuous search for new findings and outcomes of scientific research, R&D work, ideas, concepts, inventions, business models, and the skills and capabilities of people. It also means introducing new methods and techniques in organisation and management, upgrading and developing infrastructure and knowledge, preparing and launching the manufacture of new or improved materials, products, equipment, services,

processes, or methods intended to be marketed or to satisfy various social needs necessary in practice. This aspect also contains a research field useful in assessing the role of gender as a characteristic feature of one of resources deployed to achieve dynamic capability to engage in innovation activity in an enterprise, economy, and society.

### 3.2. The dualism of innovation: creativity versus commerce as a source of the search for the importance of gender

Although innovation may be of various natures, ranges, or scopes, from minor adaptations to breakthroughs, and although they make our lives both easier and more difficult as they transform our surroundings into something more and more complex, they may also significantly affect the system of values, institutions, and decision-making processes. Hence, every element of this driving force, including gender, needs to be adequately studied and utilised. In this context, the optimum definition is the one saying that ‘innovation is hard, purposeful work making very great demands on diligence, on persistence, and on commitment; that it requires that innovators build on their own strengths and, that is an effect in the economy and society, because it changes the behaviours of entrepreneurs and consumers’ (Drucker, 1985, pp. 152-153). There is no doubt that the term ‘innovation’ is used in its double meaning:

1) on the one hand, it describes a process encompassing research, design, and development works, creating new relationships among people (men and women), and organisation of the process of manufacture of a new product, process, or system, where human *creativity* is the basis;

2) on the other, it describes the first application of a new product, process, or system, through *commercialisation*.

The creative aspect denotes both the potential of knowledge and skills to create something new. Although it is a cognitive process, it leads to new, original ideas, concepts, associations, and new ways to practical problem solving. But it is also a process that cannot be captured by means of any simple pattern. Something new can be created both as a result of laborious research and by accident – triggered by intuition and imagination, unconventionally, which was often emphasised by Einstein. Intuition and imagination usually draw on knowledge and detailed reflection, predispositions to acquire knowledge, and capabilities to utilise it. The exceptionality of creativity lies in the fact that it is virtually inexhaustible: ‘You cannot use up creativity. The more you use, the more you have’ (Angelou, 2010). This thesis is exemplified in an interesting set of quotations defining creativity, found on the internet portal known as: *The Head of Innovation (Idea Champions, 2010)*. Here are a few of them:

- The things we fear most in organisations -- fluctuations, disturbances, imbalances - are the primary sources of creativity’ – *Alfred North Whitehead*
- ‘The chief enemy of creativity is “good” sense’ – *Pablo Picasso*
- ‘Creativity is thinking up new things. Innovation is doing new things’ – *Theodore Levitt*
- ‘If you have nothing at all to create, then perhaps you create yourself’ – *Carl Jung*
- ‘I can’t understand why people are frightened of new ideas. I’m frightened of the old ones’ – *John Cage*

Creativity often escapes rationality which, in commercial terms, is of key importance, and at first sight looks absurd, although it can lead to inventing something new thanks to unconventional imagination. It is very difficult to define creativity precisely, to identify or measure it. This is so, for instance, because the element of novelty is understood in many different ways or is sometimes even ignored. For creativity can make social and economic life better, but – when manipulated by the few – it can also make it worse. A spectacular example of this feature was the latest global crisis with its origins, most importantly, in “creating” extraordinary financial instruments, including fraudulent financial pyramids, toxic derivatives, and other financial pseudo-innovations. Another example – unfavourable to consumers and the natural environment (but generating profits for manufacturers) – is the tendency to manufacture short-living products, creating additional demand for complementary services and products (e.g. chargers compatible with only one type of device, such as a computer, a mobile phone, etc.). It is by no means a coincidence that more and more researchers point to the emergence of a social phenomenon of tiredness with progress, translating, in practice, into the diminishing final usability of progress. Difficulty in assessing and measuring creativity is also related to deficiencies of statistics and its meanders, various social stereotypes and prejudices to a large extent connected with gender issues. Therefore, a research field important for assessment of the role of gender in creative activities may be the sphere of creative thinking and analysis of the elements which mark the borderlines of this sphere. The scale of the openness of women and men to individual qualities of creative thinking does provide a true opportunity to assess the role of gender in individual stages of the innovation process or development of culture of innovation. Creative thinking is made up of many structured and mutually interconnected elements shaping it (Cempel, 2012), such as:

- Flexibility;
- Risk;
- Excellence;
- Self-discipline;
- Difference;
- Divergent thinking;
- Converging thinking;
- Ambiguity;
- Diligence;
- Redefinition;
- Cleverness;
- Sensitivity;
- Originality;
- Liquidity.

Given the fact that natural creativity reaches its peak at pre-school age and gradually diminishes, the only way to reduce the pace with which it diminishes is to regularly use various methods for sustaining it. And so, for instance, through education or gaining and accumulating knowledge, creative capability can be improved; however, if this knowledge is not expanded and the capability is not deployed in education, life, and work, it will also diminish. Creativity techniques and the purposeful expansion of knowledge are a pre-condition for expanding the scale of qualities of creative thinking, such as excellence, self-discipline, openness to risk, distinctiveness, etc. The development of these qualities, due to



their nature, is determined by individual psychological, social, and cultural predispositions, including gender. The level of their utilisation affects the quality of thinking and the degree of losses in creativity. As J. Chafee (2001) shows, only 3% of thinking is used to solve problems in an unconventional or breakthrough (intuitive) way, and only 7% allows intuition to be translated into creative action. No wonder that creativity perceived as equivalent to the ability to see a broader picture, being brave enough to address challenges and capable of coping with any situation, is among the most desirable qualities on the present labour market. For some, creativity is an innate quality; others say that creativity can be developed and that it is worth working on it (through education and creativity techniques), because it is released mainly through (Tracy, 2010):

- clearly defined objectives,
- acute problems,
- specific questions.

In this context, creativity is a basis for research and development work (basic research, applied research, and experimental development work) expressed by persistent creative work undertaken with a view to enhancing knowledge resources (including the knowledge about human beings, culture and society) and finding new applications for them. According to official statistics, women much more rarely than men are represented in the area of creativity, innovations, inventions, and scientific achievements. This is reflected, for instance, in the statistics concerning female Nobel Prize laureates. Women account for less than 5% of the total number of those awarded. Yet, when assessing the actual creativity of women, one cannot rely only on numerical data. As Einstein appropriately put it: ‘Not everything that can be counted counts, and not everything that counts can be counted’ (Izquotes, 2014). And yet, attempts to measure creativity are very common (Table 1), although they do not account for gender issues.

**Table no. 1 – How to measure creativity**

Indicator	Scope	Source of Information
European Creativity Index	Human capital, technologies, institutional environment, openness and diversity, social environment	The contribution of culture to creativity, KEA, 2009
Hong Kong Index	A set of interdependent variables which together form the creative environment	Home Affairs Bureau of the Hong Kong Special Administrative Region Government, A study on a Hong Kong Creativity Index, 2004
Euro-Creativity Index	Set of features attracting the “creative class” - technology, tolerance, talent	Europe in the creative age, Florida R., 2004
Flemish Index	Technological innovations, entrepreneurship, openness of the society. Used to make interregional comparisons	A Composite index of the Creative Economy, the Catholic University of Leuven, 2006
UNCTAD Global Data Base on the Creative Economy	International trade in creative-sector goods and services (export/import)	Creative Economy Reports 2008 and 2010, UNDP, UNESCO, UN

Indicator pertaining to innovations		
EIS, IUS	Technological innovations. It is used to make comparisons among countries, a version of ERIS with a smaller number of variables also used to make inter-regional comparisons.	The European Innovation Scoreboard, The Innovation Union Scoreboard, European Commission

*Source: own elaboration*

Although the examples of indicators used to measure creativity form a basis for performing an institutional assessment of the level of creativity in general, the actual inventiveness and creativity of women in solving difficult every-day problems, and also in social and economic areas, including education, design, fashion, medicine, media, tourism, social communication or culture (creative industries) cannot be overestimated. In this sense, women are great but quiet creators and the Polish saying ‘Where the devil does not manage, it sends a woman’ illustrates the enormous creative potential of women. Surely, better unitisation of women’s potential will be facilitated by the development of information society segments where there are more and more jobs offered to women. Due to the utilisation of their potential, favourable conditions are being created for the development of ‘social futurism’ postulated, *inter alia*, by Alvin Toffler, first of all through establishing centres focused on interdisciplinary ‘brain activation’ at every level of social and economic life with a view to selecting the social consultants of the future. Social futurism may become a remedy for narrow economic technocracy and the short-sighted approach to economics represented mainly by men, particularly because progress and dynamics of changes render traditional business objectives irrelevant (Toffler, 2000), and foresight research forms a basis for building multi-dimensional development strategies at various levels of the economy and society (Okoń-Horodyńska, 2011).

Creativity is a concept which has already left the area of theoretical discussions (Florida, 2002) and become firmly rooted in the economy, serving as a basis for defining creative industries, first – as an experiment – in the UK (Department for Culture Media and Sports, 1998), and subsequently triggering pursuit in the creative economy in many other countries. Creative industries can be described as originating from individual creativity, capabilities, and talents, showing potential for creating wealth and jobs through generating and deploying intellectual property. Those industries originally categorised as creative were: advertising, trade in antiques, architecture, handicraft, design, fashion, film, computer and video games (entertainment applications), music, performing arts, publishing, computer software, TV, and radio; today this catalogue is gradually expanding (Creative Economy, 2013, p. 22). A vehicle for transition from intellectual deliberations on creativity towards its materialisation may be the statement that:

*Creativity is the entire process by which ideas are generated, developed and transformed into value. It encompasses what people commonly mean by innovation and entrepreneurship [...] it connotes both the art of giving birth to new ideas and the discipline of shaping and developing those ideas to the stage of realized value. The crucial variable in the process of turning knowledge into value is creativity (Kao, 1997, p. 17).*

Perhaps it should be added that what is meant here is the transfer of knowledge into exchangeable value, which makes it a transition from a creative process taking place in laboratories, often ending with an innovation, to commercialisation of the products and services created in this process, which takes place on the market. In this context, definitions

explicitly focusing on the commercial aspect of innovation become objects of particular interest. For instance:

- ‘A commercial innovation is the result of the application of technical, market, or business-model ingenuity to create a new or improved product, process, or service that is successfully introduced into the market’ (Alic *et al.*, 1992, p. 43);
- ‘The innovation journey is a collective achievement that requires numerous entrepreneurs in both the public and private sectors’ (Van de Ven *et al.*, 1999, p. 149);
- ‘Innovation change means creating and launching new goods or technologies, accompanied by restructuring of the systems of an organisation’ (Janasz, 2004, p. 29).

A combination of creative and commercial approaches to innovation is found in the following statement: ‘Invention is the first occurrence of an idea [...], while innovation is the first attempt to carry it out into practice’ (Fagerberg *et al.*, 2006, p. 4). Both the creative and commercial dimensions of innovation demand specific skills, where gender may be an advantage or disadvantage. As a result of developments in science and technology and of changes in the eco-sphere, the concept of innovation and its relationship with creativity is evolving, while the process of globalisation and development of IT technologies in the area of information flow results in the growing practical importance of creativity and generating ideas. The need for continuous, permanent (Morris, 2006) development in innovation in a company and society necessitates the continuous search for ideas. Since creativity generates ideas and ideas, in turn, are the source of innovations, continuous acquisition of ideas becomes an important issue. Given the growing complexity of innovative products, the problem of excellent collaboration among specialists (men and women) in various areas of science and technology as well as companies, universities and R&D centres, and non-profit organisations gains prime importance. To look at the economy as an environment where innovations are developed and implemented and where various branches of knowledge are utilised by better cooperation between women and men means focusing on creativity which is a catalyst for development of science, technology, skills and capabilities.

#### **4. INNOVATIVE GENDER – AN APPROACH TO INTEGRATED GENOME OF INNOVATIVE GENDER**

##### **4.1. Why innovative gender**

Innovation has been given a prominent role in the new Europe 2020 Strategy and in one of its “flagship initiatives”, the Innovation Union. Recruiting and retaining women in scientific and technical fields is seen as a key to success for the 2020 Strategy. A number of studies and reports have stressed the acute problem of women’s under-representation in science in the business enterprise sector. Whilst women represent over 35% of all researchers in the higher education and government sectors of most European countries, this is not the case for the corporate sector. The percentage of female researchers in the business enterprise sector is less than 25% in most countries (Europe 2020). Yet another flagship initiative under the 2020 Strategy, the New Skills and Jobs Agenda, focuses on the need to modernise labour markets, increase labour participation and match labour markets and skills. Studies show that the European labour shortage is likely to have more effect on female or male dominated occupations than on less divided sectors (European Commission, 2009). Occupations in healthcare and ICT are already affected by the shortage of

professionals in Europe. For example, the rapidly growing demand for ICT specialists was one of the motivators behind the European Code of Best Practices for Women and ICT launched by the European Commission (Danilda and Thorslund, 2011, p. 20). Organisations that have signed the Code include global corporations like Google, Cisco and Microsoft, and research institutes like the Research Council of Norway. There is considerable interest in the design of new measures to get more women involved in technology as well as innovation processes in the business enterprise sector. This will tackle the demographic challenge and achieve innovation results. A European dialogue is underway, linked to the innovation case for gender diversity. This dialogue is reflected in the policy, practices and various programmes providing funding for cluster initiatives. Equal participation of men and women is essential for Europe to exploit the full potential of innovative strengths – not only for demographic reasons, but also in the case of innovation processes and results. There is a need to clarify which (new) cluster-policy related measures can support the process to get more women involved in the innovation process of business and research. Observation of many innovation exercises shows that optimal innovation occurs when there is an equal mix of men and women using a systemic process (SIT, 2011). When a predominately male group tries to innovate, the results are less impressive. And when a predominately female group tries to innovate, the results are also less impressive. But put them together and the results are amazing. Research in this area may provide some suggestions as to why (Millward and Freeman, 2002). The essence of the research is that, while men and women are equally innovative, their gender role within the context of an organisation can affect how they are perceived and how they behave when innovating and sharing ideas. Men are perceived as more innovative and risk-taking, and women are perceived as more adaptive and risk-averse. Thus, gender roles may interact with the role of the manager to inhibit (in the case of women) or facilitate (in the case of men) the likelihood of innovative behaviour. The results of the research suggest that innovative solutions were attributed more often to a male than a female manager, whereas adaptive solutions were attributed more often to a female than a male manager. Perhaps men are expected to take more risks when innovating and sharing ideas. Failure is less damaging to men because that is what is expected of them. Women are expected to be less risky, and this appears to limit or constrain both their degree of innovation and their willingness to share it. Failure is more damaging for women so they behave more adaptively in innovation exercises. There is both a negative and a positive side to this. On the one hand, innovation workshops need a process to assure that women feel they can innovate and share those ideas with the group. If, as the research suggests, women are more likely to hold back, then the facilitation approach has to break through this. Otherwise, we lose the inherent value of the (equal) innovation talent they bring to the table. On the positive side, these differences can be beneficial. This more adaptive behaviour in women and more risk-taking behaviour in men provides a certain balance or harmony during innovation, is a complementary effect that seems to yield better results. It means that each partner holds the other accountable for ideas that are, at the same time, novel but adoptable. Working in pairs, men and women also do a better job of expressing jointly-developed new ideas that may help overcome the risks that women may be feeling. Workshop processes that pair men and women up to take advantage of this are going to be more fruitful and differential role expectations have had no impact on the production of actual solutions. These findings are discussed for their potential to complement existing research on role expectations and innovation as well as their implications for the development of a new research agenda (Millward and Freeman, 2002).

To become *an innovative man or woman* (in a given place and time) means that each human being must make use of all the opportunities to develop her/his skills and capability to contribute best to the country's devolvement and better quality of life/wellbeing for an individual/family through: participation/cooperation, new ideas, solid knowledge. So, combining the *gender issue and innovativeness* should bring new findings to the foundations of smart growth and future-oriented development

#### 4.2. The innovation genome model as a background for innovative gender methodology

On the basis of the characteristics of the aforementioned changes in the perception of innovation as well as inferences from the many variants of the process of innovation, research has adopted the concept of the innovation genome (Degraff and Quinn, 2007), as the process of their formation. Its uniqueness lies in its strengthening of the criterion of creativity, its multi-dimensionality, the need for cooperation and balance, as well as capturing the transition from closed to open innovation, which decided on its usefulness in the sense that it can provide a map of areas of research on the importance of gender in the innovation process. It is possible from this model to extrapolate and connect the two main economic categories the form the subject of the studies undertaken, namely the *innovation process*, based on creativity and its determinants, and the *gender issue* from the perspective of the diverse and complex relationship between men and women and the importance of their participation in the different phases of the innovation process. The original innovation genome (Figure 1) is made up of four squares representing areas of the innovation system:

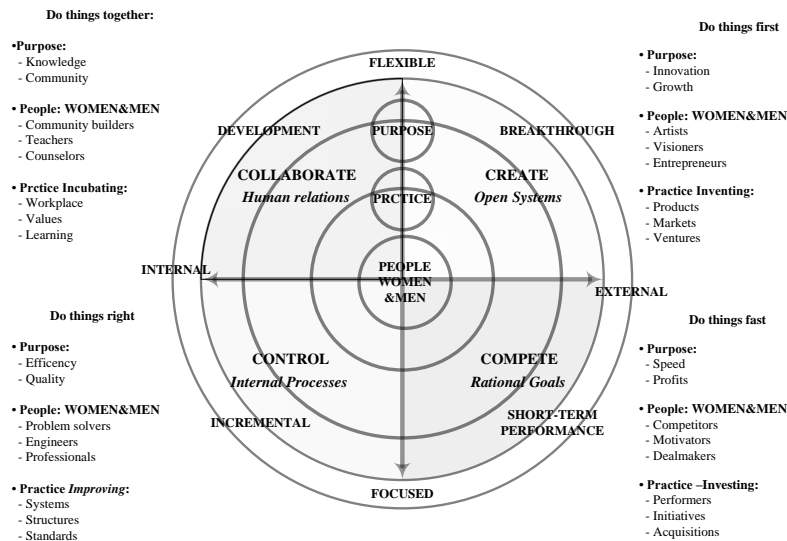
- collaborate;
- create;
- compete;
- control.

For each square, practical methods for creating various forms of value have been described. The strengths and weaknesses of each area as well as interactions among them determine an organisation's ability to create innovation in specific economic, social, and political conditions. Each of the four areas has relevant measures defined to assess the effects achieved, its individual environment, practices recognised within an organisation, and teams or delegated leaders. The central point of the innovation genome is the creation of value by people in all possible areas simultaneously, based on the following formula (Degraff and Quinn, 2007, pp. 11-12):

#### PEOPLE + PRACTICE = PURPOSE

where:

- purpose – the outcomes people want to achieve,
- practice – any activity and value perceived as important by the people involved in pursuing the purpose,
- people – all people involved in activities aimed at achieving the purpose. And in this model block, the first substantial methodical modification key for research has taken place – considering the "people" resource in the distribution of women and men (Figure 1), taking into account their specific characteristics and roles in the innovation process.



Source: Based on Degraff and Quinn (2007, p. 12)

Figure no. 1 – Innovation Genome Model as a map of areas for Innovative Gender

Subsequent modifications of the innovation genome model are oriented by the connection between the aforementioned categories, and so the *innovation and gender process* and their location in the institutional environment to a large extent determining the relationships between men and women, as well as the social and economic utilisation of their creativity and the importance of their participation in the innovation process. As a result, there arises the need to build an integrated model of the innovation genome, which is known as the *Integrated Genome of Innovative Gender – IGIG*.

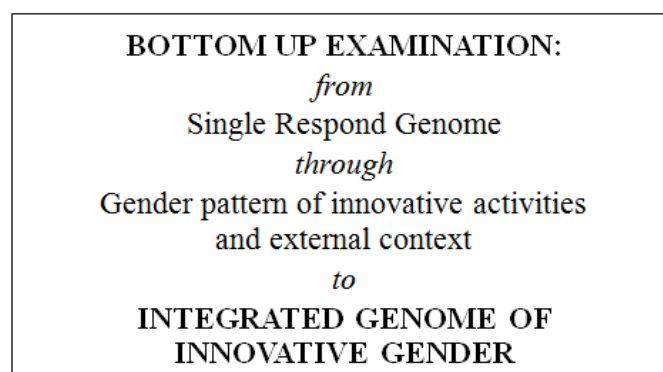
### 4.3. Integrated Genome of Innovative Gender – IGIG

It is assumed that the issue of equality of the sexes in general, manifested as equal accessibility to education, equal rights, equal pay, equal access to the labour market, equal access to vocational training, equal promotion opportunities in employment, equal social benefits and rights, equality in the performance of social and political roles, equality as regards employment security, equal right to maternity leave and unpaid extended post-maternity leave in a given social and economic system is already maintained; any gaps in this respect may only be neutralised institutionally. There is one more issue to discuss – an evaluation of the deployment of ‘gender resources’ in the process of innovation, and its impact on the outcomes. In the research project, the equal role of gender in the innovation process is called Innovative Gender, which is more about process changes which are created, implemented, and disseminated by various teams made up of collaborating men and women from various social groups, engaged in a team as professionals (scientists, researchers, engineers, etc.) or quasi-professionals – process participants who are community workers creating changes and disseminating their outcomes, or politicians providing institutional support for such processes. The concept of Innovative Gender grants to men and women equality of measures, opportunities, and situations, falling within the scope of the innovation genome model.

Although the multi-dimensional character and wide scope of the areas encompassed by the innovation genome shows that the process of innovation involves all members of an organisation and selected specialists from cooperating organisations, the issue of gender is not accounted for, yet. It can be expanded to include certain elements and the innovation genome, serving as the basis for Innovative Gender, may then represent a model of the innovation process, accounting for all aspects falling within this broad scope, including the importance of gender. Based on the innovation genome model, a starting point for Innovative Gender research is the construction of dedicated matrices (up to now in the case of innovative gender research there are five), containing information (variables) describing a given area through a gender perspective. For the time being, a *pathway to innovation* has been presented, made up of six stages:

- Stage 1 – the generation of ideas,
- Stage 2 – the gathering of ideas,
- Stage 3 – selection of ideas to be implemented in the formal process of innovation<sup>2</sup>,
- Stage 4 – the development of ideas<sup>3</sup>,
- Stage 5 – the project<sup>4</sup>,
- Stage 6 – the implementation and diffusion of innovation.

At every stage of the innovation process, although to varying degrees, men and women are involved. They perform different work, represent different levels of creativity, have different inspirations, drawing both from their own skills and experience, as well as acquiring other bundles of new knowledge and information from the environment. Focusing on the differences, usually in studies taken as the basis for claims arising out of the various dimensions of gender discrimination, is not under consideration here. In the Innovative Gender approach, it is more about process changes, in which the creation, implementation and dissemination involve various teams of cooperating men and women belonging to different social groups, whose participation in the team can be either professional (scientists, researchers, engineers, etc.) or quasi-professional, where participants in this process are social workers, creating changes and disseminating their results, or politicians securing such processes institutionally. It is therefore important to examine and evaluate the role (contribution), and the usefulness of the participation of women and men at every stage of the innovation process, defining the specific requirements for promoters. Based on the above assumption, the research process can be described by the following schema (Figure 2).



*Source: own elaboration*

**Figure no. 2 – Diagram of the research methodology**

Conducting research using the bottom-up logic, it is planned to build a single respond genome and then placing conditions on it resulting from gender (gender pattern of innovative activities) to create an integrated genome, encompassing the characteristic determinants of gender in the innovation process. The starting point is the analysis of the matrix of relationships between the characteristics of the participation of women and men in the innovation process (vertical axis), specifying the requirements of execution at each of its stages (horizontal axis) (Table 2).

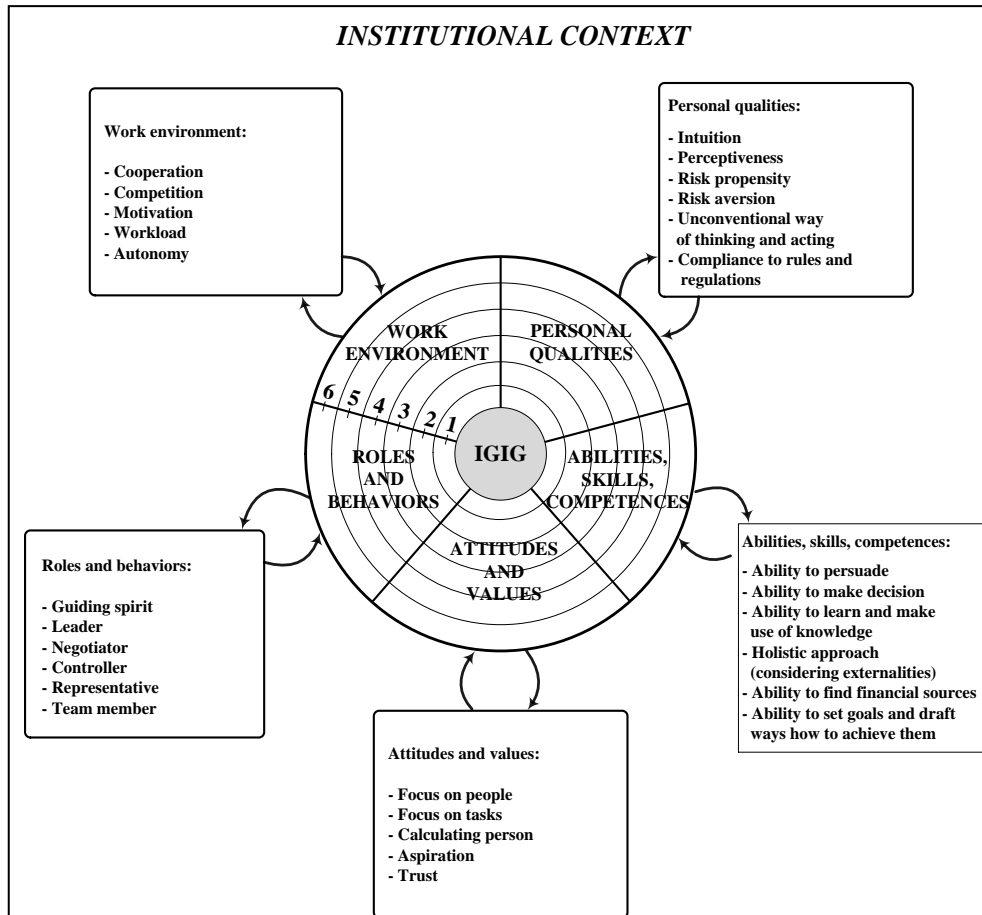
**Table no. 2 – Integrated Genome of Innovative Gender Matrix**

<b>Indicator</b>	<b>Stage 1 Generating ideas</b>	<b>Stage 2 Managing ideas</b>	<b>Stage 3 Selection/ prioritisation</b>	<b>Stage 4 Developing ideas</b>	<b>Stage 5 Project management</b>	<b>Stage6 Implementation &amp; diffusion</b>
Work environment: cooperation, competition, motivation, workload, autonomy						
Personal qualities: intuition, perceptiveness, risk propensity, risk aversion, unconventional way of thinking and acting, compliance to rules and regulations						
Abilities, Skills, Competences: ability to persuade, ability to make decisions, ability to learn and make use of knowledge, holistic approach (considering externalities), ability to find financial sources, ability to set goals and draft ways how to achieve them						
Attitudes and values: focus on people, focus on tasks, calculating person, aspirations, trust						
Roles and behaviours: guiding spirit, leader, negotiator, controller, representative, team member						

*Source: own elaboration*

Individual matrices contain a description of the characteristics of the participation of women and men at all stages of the innovation process, depending on the gender pattern of innovative activities (e.g. gender pattern of creativity, gender pattern of competition). On the basis of the collected research material those characteristics will be extracted which are perceived by men and women as most important at the various stages of the innovation process from the perspective of practice. The individual characteristics of the participation of women and men in the innovation process taking into account all the paths of innovation activity make up the matrix of the integrated genome of innovative gender.

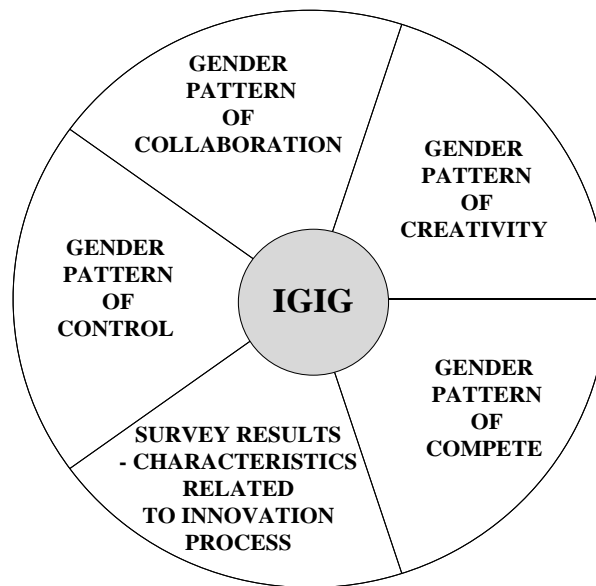




Source: own elaboration

Figure no. 3 – Integrated Genome of Innovative Gender

The research material will be obtained using the method of survey, in-depth interviews and also expert research, and the respondents will be men and women involved in different ways in the innovation process. The final results will be included in the IGIG model (Figure 3), which will demonstrate a differentiated approach to the innovation process depending on gender. On the basis of the results specific patterns will be developed constituting a fundamental modification, using aspects of gender, of the innovation process proposed in the Degraff model (Figure 4).



*Source: own elaboration*

**Figure no. 4 – Gender patterns in the process of innovation**

The resulting matrix is thus integrated as it combines in a whole the individual characteristics, giving a coherent picture of the participation of women and men in the innovation process, taking into account the requirements of each of its stages, the types of patterns of innovation activity among men and women functioning in a specific institutional environment.

#### **4.4. Innovative gender and institutional change**

The expectations regarding IGIG are such that this model will enable us to observe differences in the approach to creativity and innovation between men and women. If the approaches prove to be different, it may mean that previously used definitions of innovation, innovation process and the policy to support innovative activities have not recognised the diversity arising from gender. And so there is a possibility that public policies supporting innovativeness are gender-biased. If such policies promote male-type innovative behaviour, treating innovativeness and creativity as gender-neutral, specific female innovativeness may be unnoticed and not supported, making innovativeness more difficult for women than men. Introduction of the innovative gender concept will indicate what incentives are needed in order to promote gender equality in the areas of innovativeness and creativity. Support for a specifically female dimension of innovativeness will add to economic and social progress and create new comparative advantages, as well as promote gender equality.

The changes introduced to the policy of promoting creativity and innovation taking into account gender relations may lead to more serious institutional changes, thanks to which the use made of the abilities and creativity of women in the innovation process will be more complete in terms of both quantity and quality. Changes in the institutional setting for Innovative Gender may mean the marking out of a new source of progress. On the basis

of the experience, it can be demonstrated that the key to creating value in the model of the innovation genome is one of its elements, namely cooperation. In the practice of economic, political and social life, the essence of cooperation between the sexes in the idea of the team has been lost, while subordination based on dependence dominates. The introduction of quotas or quotas will not solve the problem, it can only structure the workers, political, or social groups; however, a group is not identical to a team. In a group, even with an equal number of women and men, functional subordination may still apply, while in a heterogeneous team the optimal potential accumulates, providing economies of scale and synergies at the same time. And so it may be fruitful to involve women and men together in the research team, and not only women, or only men. Attention should be paid here to the multi-dimensional differences stemming from gender, which should be perceived as a totally positive element, because they are the source of synergy resulting from the collaboration of research or business teams in the process of innovation.

## 5. CONCLUSIONS

Concentrating attention in the proposed report has been focused on proposals for a methodology of an integrated genome of innovative gender (IGIG), the essence of which is to prepare to continue research on a tool for measuring gender in the innovation process, enabling the assessment of the two levels of activity in an innovative economy. The first is the result of the operation of enterprises in the form of the scale and structure of the innovations generated through effective use of the existing potentials in the economy; the second is to develop features of the economy that are determined by innovation denoting the ability of businesses and the economy to generate ideas, and create and implement innovations, as well as their absorption. The process of innovation in the studies undertaken, however, is to be observed through the prism of the importance of the concept of gender located in it. Thus, for the forthcoming research methodology, the most important stages of the innovation process were selected, which in this case are treated on the one hand as research areas designated in the research project *Innovative Gender as a New Source of Progress*, while on the other as the distinctive participation of women and men in various stages of this process. From this point of view, the area of research determines the need for a thorough assessment of the progress and results of the innovation process including a comprehensive catalogue of the attitudes, roles, behaviours, and characteristics of the participants in this process (women and men). Thus, as the starting point for the preparation of the IGIG methodology it was necessary to recognise such areas as:

- the essence of gender in the institutional context
- creativity, innovation, models of the innovation process and innovativity, and
- identification of the attitudes, behaviours, roles and characteristics of the people involved in the different phases of the innovation process.

As a result of the preparatory work, it is determined to put the results in matrix formulae, the common area of the indicated partial areas which is the necessary starting material for the construction of a significant new tool for measuring the role of women and men in the innovation process. At the core of the construction of this methodology is an attempt to move away from the stereotypical character logical description of men and women based on assumed *a priori* groups of specific behaviours, roles, attitudes and characteristics. The attempt to develop this measurement tool, based primarily on the qualitative determinants, free from such assumptions, aims to explore the phenomenon as it

is in reality, without the prior characterological polarisation. Thus the InnoGend concept in searching for specific roles and actions by women and men in innovative activities may bring some new research and practical effects, like:

- new approach to identification of commonalities and differences of gender related innovation activities, (barriers, gaps, opportunities, effects)
- new methodology in research on gender related activities
- marking the range of rational equality entries in strategic documents on which the state's innovation policy is based
- changes in the institutional environment supporting conditions for the development of men's and women's innovation activity geared towards achieving success.

The considerations in this study are not yet a completed methodical concept, but an outline and material prepared for verification, as the principal has assured a 3-year study period. Dissemination of this research approach in the initial phase, however, provides a chance for reliable review and improvement.

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<sup>2</sup> In line with the priorities arising from the strategy of the company, region or country.

<sup>3</sup> This applies to all research, development, knowledge and technology transfer, cooperation and competition necessary to process the idea in innovation and determination of the cost of these activities.

<sup>4</sup> This refers to the implementation of all activities managed in accordance with the adopted methodology, aimed at achieving innovation suitable for commercialization. This step includes such issues as: fashion, design, continuation of market research, preparation of a strategy of innovation diffusion, marketing, creation of spin-offs, and cooperation.