



WORKING PAPERS SERIES
DIPARTIMENTO DI
SCIENZE SOCIALI ED ECONOMICHE
n. 11/2017

**Decision Theory Application in Agricultural
Entrepreneurship Promotion.**

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Abstract.

This study investigates opportunities of decision theory application in agricultural entrepreneurship promotion, it considers behavioral characteristics of entrepreneurs in the sphere of agriculture, identifies the common biases in potential entrepreneurs' decision making process and suggests a number of decision theory approaches (including NUDGE instruments), applicable in debiasing entrepreneurial decisions as well as in motivating entrepreneurship in agriculture. The paper demonstrates the issue of limited attention to the differences between hereditary and non-hereditary entrepreneurs decision making process in agricultural policies.

In order to investigate the effect of non-pecuniary instrument on potential entrepreneurs' behaviour, a model of a policy effect on entrepreneurial decision was created and a new classification of entrepreneurial decision criteria was developed. The experiment was conducted in the University of Barcelona with 253 participants and has proven that the suggested non-pecuniary instrument of agricultural entrepreneurship promotion has significant positive effect on the attractiveness of the agricultural sphere of entrepreneurship. Experiment results has also demonstrated that non-pecuniary factors play greater role in decision making process of individuals, who are more attracted by the agricultural sphere of entrepreneurship.

Key words: Non-hereditary Entrepreneurship; Policy; Decision Theory; Agriculture; Bias.

JEL classifications: Q18, D91, L26.

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1. Introduction.

Entrepreneurship plays an important role in agriculture. It brings innovation to the economy and contributes to the rural areas development. According to the recent paper by Pyysiäinen (2013), the policy implementers believe that farmers need to be activated into entrepreneurship by external interventions. Entrepreneurship in agriculture receives strong financial support from international organizations. European Agricultural Fund for Rural Development (EAFRD) budget is 95 billion euro allocated in grants to countries implementing their rural development programmes. However, the policies aimed at agricultural entrepreneurship motivation don't take into account the differences between different representatives of agribusiness. Also low attractiveness of the industry among young entrepreneurs (Sulaiman and Abdullah 2013), biased perception of the agricultural sphere opportunities (Fursdon, 2013) and lack of motivation of new entrants decrease the effect of existing policies.

Decision Theory (DT) as a science, which is focused on decision making process analysis, might provide a great contribution to the agricultural entrepreneurship promotion. The goal of this paper is to suggest new approaches to agricultural entrepreneurship motivation through Decision Theory application. The paper will consider existing policies focused on agribusiness motivation, divide agricultural entrepreneurs to groups, which present the greatest differences from decision making perspective and show whether the groups receive sufficient support by the existing policies. A new classification of entrepreneurship determinants will be created in the paper as well as the model of a policy effect on entrepreneurial decision. The model will be used in an experiment, which would simulate an effect of a Decision Theory based instrument on potential agribusiness entrepreneur's decision.

2. Existing Policies of Agricultural Entrepreneurship Motivation.

According to the EU Strategic Guidelines for 2007-2013 the EU Member States were supposed to develop their national rural development strategies, which were co-financed by the EAFRD. According to the Axis 1,2,3 and 4 of the EU Rural Development Programmes 2007-2013 (RDP) the budget was dedicated to multi-functional support of the rural areas. During the six year program 1,888,613 agricultural holdings with handicaps

received financial support. RDP also promoted environmentally friendly farms through the Agri-environment payments (Measure 214 of the RDP). The quality of life improvement in rural areas was another contribution of the RDP. It included rural infrastructure building that created access to the farm lands as well as energy supply and water management. RDP also supported 43,515 investments in energy, social, environmental and ICT infrastructures, training and childcare. RDP supports and co-finance investments in technical modernization: Axis 1 states 20,070 such enterprises supported by the RDP. 126,156 young farmers received financial support, 36,059 new micro-enterprises were supported or created.

Vocational trainings and educational programs represent another way of agricultural entrepreneurship enforcement. Axis 1 declares 3,637,475 participants of the training programmes. RDP activities are further extended to agricultural entrepreneurship diversification into non-agricultural activities (15,039 new tourism activities supported).

The LEADER EU project is an integral part of the EU Rural Development Plan, which involves local representatives of the community in rural development strategy planning, so the local actors are involved in decision-making process of the so-called Local Action Group (LAG). According to the overview of the EU LEADER programme (Perez, 2000) it has a number of positive effects.

The European Social Fund with a budget of €80 billion assists entrepreneurs in rural areas in establishing and growing their own businesses by improving their and their workers skills.

The new Common Agricultural Policy 2014-2020 continues the previous reform path, moving from product to producer support, according to the Agricultural Policy Perspectives Brief (N5 from 2013). The new CAP is expected to provide support in addressing such current challenges as economic, environmental and territorial. The CAP was divided into two 'Pillars': first pillar represents production support in form of direct payments and market-related expenditure, while second pillar is focused on Rural Development.

The 2014-2020 CAP has a number of new features. One of these features is rewarding farmers for the services they deliver to the wider public, such as landscapes, farmland

biodiversity and climate stability (Agricultural Policy Perspectives Brief, 2013), what creates a new instrument of the first pillar, which is focused on provision of environmental public goods.

The 2014-2020 CAP first pillar consists of direct payments to farmers and common organisation of the markets (Ragonnaud, 2016). The direct payments to farmers key elements include basic payment scheme, schemes for the redistribution of basic payments, young farmers schemes, greening (payments for climate- and environment-friendly practices), additional payments for the areas with natural constraints and stricter rules for the farmers, for whom agricultural activity is not the central one (Massot, 2016).

The priorities of the 2014-2020 CAP second pillar are: to support innovation in agriculture, improve the competitiveness of all types of agriculture, support the creation of the food production chain and risk management in farming; enforce agricultural and forest ecosystems; promote the sustainable use of resources and assist in conversion to renewable energy, to reduce poverty through job creation and providing sufficient access to information (Ragonnaud, 2016).

Establishment of the specialised food networks is another approach used by the EU member states (Marsden and Smith 2005). The Member states constantly finance research devoted to identification of optimal strategies of rural areas development. In 2008 Switzerland has introduced a New Regional Policy (NRP) to support regional value-added creation more effectively.

The EU member states often fund consultancy support for agricultural entrepreneurs and farmers, for example, the Farming Advice Service financed by the Department of Environment, Food and Rural Affairs in the UK assists local farmers. Support of the local initiatives in regional brand building, which are focused on a more intense communication of quality of the local products, is another instrument applied on the EU member states level (Marsden and Smith, 2005).

This FAO report mentions an important instrument in rural areas development, which is “placing an element of local identity at the core of territorial strategy”. This instrument assumes that a group of local producers unites on the base of the region, raising up some

traditional recipes, technologies or products. The report mentions several successful examples such as Antico Frigano area in Italy, the Pays Cathare in France and others.

The chapter listed a number of initiatives, focused on agricultural entrepreneurship promotion and motivation. However, agricultural entrepreneurs as a group consists of diverse individuals, what assumes that motivating factors for each subgroup of potential entrepreneurs can be different. The next chapter would present two subgroups of agricultural entrepreneurs, who are different from the Decision Theory perspective, and would show whether both groups receive sufficient support.

3. Deficiency of Non-hereditary Entrepreneurs Motivation.

Decision Theory (DT) diversify decision makers according to their decision criteria and decision alternatives. Taking into account DT perspective, agricultural entrepreneurs can be divided into two groups: hereditary and non-hereditary.

Hereditary entrepreneurs, due to the fact that they already have a farm, have considerably different decision making process in contrast to non-hereditary. According to the FAO classification of farmers and entrepreneurs, hereditary entrepreneurs are the farmers who decided to increase their production of agrifood and to produce for the market, what assumes a binary decision process: the farmer either decides to become entrepreneur or continues farming primary for the home consumption. Non-hereditary entrepreneurs, in contrast, often do not have previous experience in the agricultural sphere and choose it specifically for entrepreneurial and business objectives. In other words, the number of decision alternatives, which non-hereditary entrepreneur considered, might be multiple.

According to the Decision Theory, decision makers with different alternatives and criteria demand different motivational tools. These two groups of individuals have different cognitive and social characteristics and apply different decision making strategies. Understanding the behavioural differences of these groups is vital in agricultural entrepreneurship promotion planning.

Most of the existing research is devoted to hereditary entrepreneurship. According to the literature, hereditary entrepreneurship in agriculture can be considered as less innovative (Faggio and Silva, 2014) and less creative, motivated more by financial factors

(Nielsen and Freire-Gibb, 2010), with limited business network and absence of systematical engagement in professional development (McElwee, 2006), lacking constant skills improvement and with dense social networks of mutual control (Baumgartner, 2012).

Non-hereditary entrepreneurs, in contrast to hereditary, enter the sphere of agriculture for business purposes, they didn't inherit farms from their parents, the sphere of agriculture is their own choice. According to the existing literature, non-hereditary entrepreneurs can be considered as more innovative, creative and effective. According to Madureira et al. (2015) new entrants in Portugal, Bulgaria and the UK had higher educational achievements than the average farmers. Sutherland (2015) proves that new entrants introduce innovation into the sphere and enable a more innovative agricultural sector. The main conclusion, according to Sutherland, is that new entrants bring to the agricultural sector new skills, networks and financial capital what leads to innovations in production, marketing and management. The International Organisations' activities aimed at promotion of entrepreneurship in agriculture and listed in the previous chapter can be divided it into two groups: actions, which influence hereditary entrepreneurs, and actions, which influence the new entrants.

As it can be seen from the table, the majority of methods are focused on hereditary entrepreneurs.

Decision Theory as a scientific sphere can provide a strong contribution to motivation of non-hereditary entrepreneurs in the sphere of agriculture by introducing non-financial instruments of promotion and focusing on the reasons of low attractiveness of the industry for young professionals. One of the DT approaches is the so-called NUDGE Theory.

Table 1. Hereditary and non-hereditary entrepreneurship promotion, existing methods.

Hereditary entrepreneurship promotion	Non-hereditary entrepreneurship promotion.
Financial support to farms with handicaps.	Rural infrastructure building.
Rural infrastructure building.	Investments in energy, social, environmental and ICT infrastructures.
Investments in energy, social, environmental and ICT infrastructures.	Co-financing of investments in technical modernization.
Training, childcare and mobility.	Financial support to 126,156 young farmers, 36,059 new micro-enterprises were supported or created.
Co-financing of investments in technical modernization.	Funds for innovative projects in agriculture.
Financial support to 126,156 young farmers, 36,059 new micro-enterprises were supported or created.	Finance research devoted to identification of optimal strategies of rural areas development.
Vocational trainings, educational programs, expert advises.	“Educational fostering of the supply of initiators of business ventures” (Italy)
Agricultural entrepreneurs diversification into non-agricultural activities.	
Encouragement of tourism activities.	
Involvement local representatives of the community in situation analysis and rural development strategy planning.	
Improving skills of entrepreneurs and their workers.	
Funds for innovative projects in agriculture.	
Establishment of the specialized food networks.	
Finance research devoted to identification	

of optimal strategies of rural areas development.

“Educational fostering of the supply of initiators of business ventures” (Italy)

Consultancy support.

Support of the local initiatives in regional brand-building.

Include training programs for farmers and assistance in cooperation organization.

“Placing an element of local identity at the core of territorial strategy” (FAO).

4. Nudge Theory Application in Agricultural Entrepreneurship Promotion.

Nudge Theory is a concept in Decision Theory, which represents a number of instruments, which assist in changing people’s behaviour without direct enforcement. The approach includes the use of five groups of instruments: Incentives, Understanding preferences (Mapping), Defaults, Feedback, Error expectation and Structuring complex choices. Nudges are applied in biases avoidance and in helping make an optimal choice. Nudges can be used as instruments in agricultural entrepreneurship promotion.

(Financial) Incentives are “financial losses or gains which seek to influence decisions” (Thaler and Sunstein, 2009). Default means that certain option is preselected and a person making choice should opt-out if he/she doesn’t like the option. According to E.J Johnson defaults are effortless, “save time”, “often represent the existing state or status quo, and change usually involves a trade-off” (Johnson and Goldstein 2003). Understanding preferences helps people to avoid different biases and better understand their real needs. The nudge is used in order to avoid influence of the context (the way the alternatives are presented, the alternatives themselves, individual’s current state that influences the perception of his/her behaviour in a different state). Structuring complex choices nudge is used in case of overloading by information, when the human’s memory, analytical and other abilities show their limits. The number of alternatives might become too great as well

as the number of their characteristics, comparison of which might also become too complicated. In this case, Structuring complex choices nudge might be applied in order to assist in building a clear understandable model or scheme for a better decision. Give feedback nudge implies giving feedback on a certain choice with an opportunity to correct it. Expecting error is a nudge, which helps to avoid predictable and common mistakes.

The nudges application depends on the decision making context. Several factors, which determine the context, are: maximization or satisfaction choice model, short or long term decision and single or repeated decision.

Decisions can be divided into two types according to the goal, which can be to maximize (maximize gains, utility, profits, consumption, etc.) or to achieve a certain satisfactory level. The decision to become entrepreneur might have a goal of maximization (of profits and non-financial benefits) or satisfaction. The maximization or satisfaction approach determines the decision making strategy. If the goal of the decision maker is to maximize the profits, he/she will choose the alternative, which, according to his/her perception, can provide the highest level of profit. If the profit should achieve a certain satisfying level, an individual might have other criteria, which should be maximized, such as non-financial self-actualization, freedom, etc.

Every decision also has a short or long-term perspective. The career choice has a long term perspective what reduces the decision making context to long-term decisions.

Another approach to decisions classification determines decisions as single or repeated. In case of a career choice the decision is mostly single.

Each of the nudge approaches can be considered from the entrepreneurship in agriculture promotion perspective and the peculiar aspect is that the nudges can be used in order to influence the potential entrepreneurs directly or indirectly. In case of direct influence the nudge would be focused on the entrepreneur, while in case of indirect influence, the nudge would influence the consumer of products, which the entrepreneur in the sphere of agriculture produces.

The increase in consumption and popularity of locally produced food increases the production volumes and profits of entrepreneurs in the sphere. The next paragraph would consider possible ways of nudges application.

The financial *Incentives* are often used in case of decisions with long-term benefits and short-term costs, which means that costs, choice and its consequences are separated in time. Incentives can be used to change people's behaviour by providing short term

benefits, which motivate them to stick to better or healthier behaviour. Incentives can be positive (payments for healthy behaviour) or negative (taxes or fees for unhealthy behaviour).

The effectiveness of incentives depends on the decision making context and the sphere of decision. In case of entrepreneurship in agriculture promotion, Incentives can be applied directly to entrepreneurs, providing financial incentives in different forms: subsidies, financing of certificates acquisition, etc. The application of financial incentives is one of the most common practices in agricultural entrepreneurship promotion, used in Common Agricultural Policies of the EU countries. In a recent article in *The Telegraph* (Gosden, 2016) the current situation of the UK farmers is discussed: farmers in the UK demand subsidies which would replace the EU's Common Agricultural Policy, which currently provides 55% of their income. However, there are different points of view on the subsidies for farmers, discussed in popular media sources. For example, in articles published in the *Economist* and *The Guardian* the subsidies to farmers are called “the most blatant transfer of money to the rich” (Monbiot, 2013) and “Milking taxpayers” (Coburn, 2015).

Incentives can also target consumers, providing indirect motivation of entrepreneurship in agriculture through increase in demand of agricultural products. The locally produced agricultural products can be promoted through negative financial incentives by putting extra fee on agricultural products not locally produced or by positive financial incentives in a form of financial compensation, bonuses or lotteries. One of the examples of application of financial incentive on consumers was \$1,000 lottery, offered by the Louisville Independent Business Alliance to consumers for participating in “buy local” program. However, the practice of promotion of local products with the use of incentives is scarce.

The influence and use of another nudge, *Defaults* is growing, what can be explained by the overloading by information. The term infobesity, which describes the information overload, appeared in 1970s and represents a problem, which is considered in a great number of articles and researches (Rogers, 2013). Defaults help to reduce time, spent on decision making process and not to consider big volumes of unneeded information. Defaults can be used when the choice for the decision maker is not of a great importance and he trusts the government, company or organization to make a choice instead of him/her. One of the most common examples of defaults is the computer software default options, which saves the users' time.

In case of consumer decisions, direct defaults (in contrast to “smart” and “alternative” defaults) are used for generic products (product’s brand doesn’t play a role in the consumer’s decision making process). The limited use of direct defaults in case of consumer goods is connected with the fact that consumers are mostly looking for the maximization, but not satisfaction (in contrast to health related decisions, when individuals often need to achieve a certain satisfying).

In entrepreneurship in agriculture promotion, defaults can’t be used directly on potential entrepreneurs as the entrepreneurial decision represents a single long-term decision which demand analysis of sufficient amount of information. However, the defaults can be used in indirect promotion of the sphere through increase in consumption of locally produced food. Locally produced agricultural food might be placed into specially decorated shelves in supermarkets on the most visible and easy to reach level, at the entrants and at the cash machines, etc. The governmental programs of locally produced food supply in kindergartens, schools and other organizations might be considered as application of the Default nudge.

The *Understanding Preferences* nudge represents a complex instrument. The nudge assumes that the Decision Maker, consumer or entrepreneur, sometimes makes biased decision due to the problem context effect, overload by information, difficulties in determining priorities, etc. S. Bond in his research (2008) shows that “in three empirical studies, participants consistently omitted nearly half of the objectives that they later identified as personally relevant”. The problem of identifying preferences and their importance as well as the influence of the environment (decision maker’s mood, problem context), decision biases such as “asymmetric dominance” or “attraction effect” which appear when a dominated alternative influences the final choice are some of the problems, which the nudge might eliminate.

Understanding Preferences nudge assumes helping the decision maker in context influence and choice biases avoidance as well as in identification of preferences or decision criteria.

The mark “Buy local” represents both Default and Understanding Preference nudge. It attracts attention of the buyer to one product out of a number of other; the green color is often used on “buy local” ads and is associated with health and nature (Cavelzani and Esposito 2010) what also influences the consumer. “Buy local” mark also attracts attention to certain characteristics, which are associated with the locally produced products,

according to the consumers' point of view. The locally produced food is often considered as healthier and also as more ethical choice (as it supports the local farmers). So the "buy local" mark attracts the consumers' attention to the product's characteristics, about which they probably were not thinking before they saw the mark. The Understanding Preferences nudge demands more research on possible ways of its application in agricultural entrepreneurship promotion.

Expecting Error nudge is used in a variety of cases, which are often related to repeated decisions or actions such as using the subway control system, using ATM cards, taking pills, etc. The expecting error nudges are focused on avoiding mistakes, such as forgetting a credit card in a machine (now the machine delivers back the credit card immediately, what minimises the probability of an error), putting a metro ticket into the machine not in a correct way (the system can be programmed in such a way that the ticket works no matter by which side the person puts it inside), etc. The possible areas of the nudge application don't include the conscious consumption choice and the entrepreneurial decision, what makes the nudge application in the agricultural entrepreneurship promotion unlikely.

Giving feedback assumes a feedback information, provided to the decision maker after the decision is made, giving feedback can be considered as an effective instrument in agricultural entrepreneurship promotion. The nudge can be applied to the consumers after the local farmers' products buying. A "thank you" check or separate paper, or anything which would show appreciation of the consumer's decision to buy local farmer's food might give additional motivation to consume local products again.

Further application of Decision Theory assumes consideration of decision determinants, which influence the potential entrepreneur's decision to start agribusiness.

5. Existing Approaches to Entrepreneurship Determinants.

Entrepreneurship determinants are the factors, which determine the quantity and quality of entrepreneurship in a certain area or economic sector.

According to the Eurostat Report on Entrepreneurship determinants (2015), most researches agree on three key factors determining entrepreneurship: *opportunities*, *skilled people* and *resources*. The Organisation of the Economic Cooperation and Development

(OECD) extends the list to five groups of determinants: *opportunities, skilled people, resources, regulatory framework and culture*. One of the key disadvantages of the classification is overlap between the subgroups. “Creation and diffusion of knowledge” have a significant effect on “Entrepreneurial capabilities”. “Creation and diffusion of knowledge” contains “University interface” and University education obviously influences “Business and entrepreneurship education” (which is included in the “Entrepreneurial capabilities” group of determinants).

S. Parker (2009) describes the determinants of entrepreneurship from another perspective. Entrepreneurship, according to his classification, depends on the difference between profit from entrepreneurship and alternative wage, human capital, social capital, risk, psychological and demographic factors, industry-specific, macroeconomic factors and characteristics of employers.

The list of determinants includes financial factor $Pi-w$ (the difference between salary and entrepreneurial profit) which strongly correlates with other determinants such as industry-specific factors, risk and human capital.

Another approach to entrepreneurship determinants suggested by Sullivan (2006) and divides the determinants to two main groups of financial and non-financial factors. His Occupational choice model includes both pecuniary and non-pecuniary criteria: $V_{iqt}^* = w_{iqt} + H_{iqt} + \varepsilon_{iqt}$, where w_{iqt} is the log wage of subject i in occupation q at time t ; H_{iqt} is the non-pecuniary utility that person i receives from working in occupation q at time t , and ε_{iqt} is an error term.

Sullivan however does not specify the list of possible non-pecuniary criteria, which the potential entrepreneur is considering.

6. New Framework for Entrepreneurship Determinants.

The existing classifications of entrepreneurship determinants can be divided into two groups. The entrepreneurship determinants, considered in the Eurostat and OECD Reports, describe determinants from the point of view of the Policy Maker, while Sullivan and Parker describe the entrepreneurship determinants mostly from the point of view of a potential entrepreneur, who considers the opportunities and risks of starting the entrepreneurial career.

This Paper makes an assumption that one of the reasons of limited causal effect of policies is the lack of attention to the differences in *Policy Maker's* and *Decision Maker's* perspectives.

The Policy Maker (PM) is planning which methods and approaches should be used for entrepreneurship in Agriculture motivation. The PM is fully aware of regulatory framework. He/she has his/her own perception of entrepreneurial capabilities in society. Also, he/she considers the cultural aspects, such as attitude towards entrepreneurship in society. Decision Maker (DM) is a potential entrepreneur, in other words it's an individual who hypothetically can become an entrepreneur in the sphere of agriculture. The DM has limited information about the agricultural sphere business opportunities. He/she is often not fully aware about all the regulations and market conditions. DM's perception of the agricultural sphere is often biased, he/she often underestimates the opportunities of the industry, is not aware of profitable directions of business and growth perspectives. Also, the sphere of agriculture can be underestimated in terms of the non-pecuniary benefits.

The existing literature shows that agricultural sphere is often considered as less attractive in terms of the non-pecuniary benefits: "Agriculture has never been considered to be a prestigious occupation...." (Kotler, 1990); "Farming and farm support programmes... should improve the image of the sector" (Leavy and Hossain, 2014).

If the Decision Maker's perspective, which is characterized by a lack of information and biased perception, won't be taken into account, the agricultural entrepreneurship promotion methods effect would be limited.

The importance of the Decision Maker's perspective directs the research to application of Decision Theory as a scientific sphere, which is focused on the decision making process analysis.

Decision making process analysis is devoted to identification of the impact of all decision determinants, taking into account peculiarities of the Decision Maker, information available and behavioural factors.

In the next chapter a new classification of entrepreneurial decision criteria will be created.

7. New Classification of Entrepreneurial Decision Criteria.

The two generic approaches which can be used in identifying a new classification of entrepreneurial determinants from the Decision Maker's perspective are the SWOT analysis and the Maslow Hierarchy of Needs.

SWOT illustrates decision-making process of an individual, who analyses pros and cons before starting a project or business. The methodology is often used in entrepreneurial projects planning, what determines it's high utility for the research.

The SWOT includes analysis of internal factors: Strengths and Weaknesses, and external factors: Opportunities and Threats.

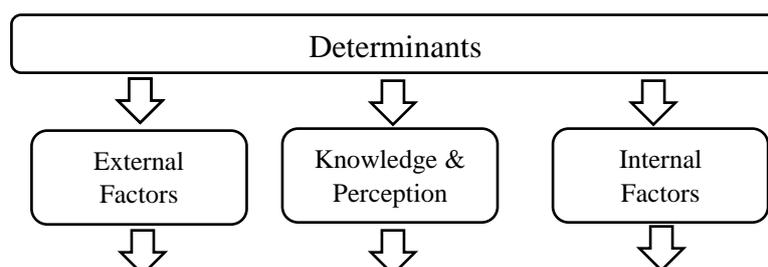
The Maslow's hierarchy represents a classification, which takes into account all human needs such as physiological, safety, love and belonging, esteem and self-actualisation. The Maslow's later works also include such needs as cognitive need (need for knowledge, etc.), aesthetic need (need for beauty) and transcendence need which is an altruistic need.

Criteria Classification.

Taking into account the SWOT Analysis, the career determinants can be divided into external and internal. In case of entrepreneurship career consideration, the Decision Makers often follow SWOT analysis approach either directly or intuitively.

The Decision Theory adds an important concept of perception of the factors, which includes limited knowledge of external determinants (limited knowledge of market opportunities, laws, financial opportunities, grants, new technologies, etc.) and biased perception of internal factors.

According to the DT the potential entrepreneur makes a final decision on the base of the future benefits, which are caused by the utilization of the external factors and internal benefits.



Entrepreneur's Expected Gains

The next step of the Paper is to create a classification of Gains, on the base of existing literature and Maslow Hierarchy of Needs.

Expected Gains as a group of factors can be dividing into two subgroups: pecuniary and non-pecuniary factors.

The two groups (pecuniary and non-pecuniary factors) represent criteria groups, which determine career choice both in case of entrepreneurial career and career in a company. Distinguishing gains as financial and non-financial refers to a common approach in organizational behavior (Dewhurst, 2009), which considers separately financial and non-financial ways of employees' motivation.

However, if the pecuniary gains were divided into components, they would be different for entrepreneurial careers and career in a company.

Pecuniary or financial gains in case of entrepreneurship, include three elements: *expected returns*, *rate of income growth* and *the period of investments pay off* (French and Fama, 1989; Williams, 2012). However, in contrast to the entrepreneurial career financial benefits, career in a company assumes different pecuniary benefits, such as salary, bonuses and growth opportunities.

The non-pecuniary benefits represent a more complex sphere of modelling and analysis due to the lack of research and absence of existing classification of non-financial entrepreneurial benefits.

The classification should be applicable in career alternatives comparison. It should contain groups of potential non-pecuniary gains, which are mutual for different individuals. So the classification should be based on a generic approach, such as the Maslow hierarchy of needs.

The Decision Theory also represents a significant instrument in non-financial gains classification creation as the theory considers non-pecuniary motivation of the decision makers and models the decision making process.

The non-financial benefits of entrepreneurship as well as non-pecuniary incentives in case of a career in a company were considered in a variety of articles and one of the difficulties in a non-pecuniary benefits classification creation is that these two groups of benefits (entrepreneurial and career based) represent two diverse groups: articles on entrepreneurship often mention freedom as one of the key benefits ("Why entrepreneurs

choose freedom over money”; “Entrepreneurship is a basic freedom”), while articles on non-pecuniary benefits at work focus on such factors as recognition and appreciation (Long and Shields, 2010). However, the nature of gains, from the point of view of the human’s needs might be the same. This is another reason to apply Maslow Hierarchy of Needs.

The five groups of non-pecuniary criteria, which were identified using the existing literature analysis and Maslow Hierarchy are the following.

Freedom. Freedom as a gain includes freedom in schedule, choosing the sphere of business, choosing the plan of development, time flexibility, freedom to make decisions, etc. Articles on entrepreneurship (Shane, 2013) and on employees motivation (Kolak, 2014, Pitt-Watson, 2014) mention freedom as an important criterion.

Esteem. Esteem includes desire to be respected, accepted by others. Be recognised and valued. Freedom applies to the “higher” esteem need according to Maslow, however due to a great importance of “Freedom” as a non-financial benefit of entrepreneurship, freedom is considered as a separate non-financial gain.

Realisation. Self-actualization in Maslow’s hierarchy means full realisation of individual’s potential. The concept of self-actualization received high attention lately and is often promoted by companies to their potential employees (Jackson and Suomi, 2002).

Social Preferences. Self-transcendence, which is the need for altruism and helping others, appeared in later works by Maslow (1970). The principle of the so-called “sustainability” in organization’s and business functioning receives a great attention nowadays (Leisinger, 2015). “Sustainability” assumes taking care of the environment and society needs, what implies that social preference should be an important value in entrepreneur’s activity.

Belonging. Belonging as a need includes belonging to entrepreneurial society, different networks, teams and organizations as well as to an entrepreneurial society. The Belonging factor appeared from the Maslow’s third level need of “Love or belonging” (Maslow, 1943).

Classification Check Survey.

The created classification of entrepreneur’s decision determinants should be checked in order to find out whether the classification covers the majority of possible criteria in entrepreneurial decision and can be applied in experiment.

Business News Daily Journal conducted a survey (2016), in which 120 entrepreneurs were asked to name the main reason of being entrepreneur. The survey data was used in order to check the applicability of the created classification. Nearly all reasons, mentioned by interviewees were non-financial. A table with five groups of criteria was created. Each reason, presented in the survey, was considered and if it was related to one of the groups, it was allocated to the corresponding column (see Table 2).

Table 2. Survey answers allocated to five groups of entrepreneurship determinants.

	Allocated	Freedom	Esteem	Realisation	Social	Belonging
<i>Number</i>	116	36	4	50	14	12
<i>%</i>	96,6	31	3,4	43,1	12	10,5

116 out of 120 reasons were allocated to one of the groups of criteria, what means that the classification covered 96,6% of all reasons mentioned by the entrepreneurs. That demonstrate that the classification is applicable in an experiment and covers majority of the criteria, which were presented in the Business News Daily survey.

In the next chapter a model of a policy effect on entrepreneurial decision will be created.

8. Modeling Policy Effect on Entrepreneurial Decision.

A policy aimed at entrepreneurship in agriculture motivation can be modeled in order to apply the model in experiments. The Paper suggests to consider the policy effect specifically on individual's decision to become entrepreneur. The Paper has demonstrated that the difference between the Policy Maker's and Decision Maker's perspective might lead to limited effect of an agro-business promotion policy. The model would be based on econometrical and Decision Theory frameworks.

Econometrical Framework.

The Policy Maker is interested in predicting the effect of a certain policy on the level of entrepreneurship in the sphere of agriculture. In other words, the Policy Maker is interested

in the causal effect of a certain action. In econometrical terms, a causal effect can be presented in terms of a treatment effect: $\Delta_i = Y_i(1) - Y_i(0)$, where Δ_i is a treatment effect, $Y_i(1)$ is the outcome for a unit i (individual i) in case of treatment and $Y_i(0)$ is the outcome for a unit i (individual i) in case of no treatment.

The Policy Maker though would be interested in an estimator which would show the effect of a treatment on a population, what can be presented as a “Difference-in-mean” estimator of the Average Treatment Effect: $ATE = \frac{1}{N_1} \sum_{i=1}^{N_1} y_{1,i} - \frac{1}{N_0} \sum_{i=1}^{N_0} y_{0,i}$

The key question in modeling the Effect of a Policy is the outcome variable y_i . The outcome variable can be presented as a binary, discrete or a continuous variable.

Entrepreneurship in agriculture, as it was discussed previously, might be hereditary and non-hereditary, most of the policies, applied in order to promote agricultural entrepreneurship are devoted to hereditary agricultural activity, however the non-hereditary agricultural entrepreneurship was proven to be more effective, bringing capital, new technologies, knowledge, education and networks into the sphere. In the previous chapter it was clearly shown that the hereditary farmer is facing a binary choice problem, while the potential non-hereditary entrepreneur in agrosphere is dealing with a multiple choice.

As the paper considers non-hereditary entrepreneurs, a model with discrete outcome variable would model the Entrepreneurial Decision more accurately. The outcome variable would take values from 1 to Q. Q represents all career opportunities, an individual would choose an alternative q if the value of this alternative would be evaluated as the greatest: $y_i = q$ if $V_{qi}^* = \max\{V_{1i}^*, V_{2i}^*, V_{3i}^* \dots, V_{Qi}^*\}$.

As the Decision Maker’s perspective assumes decision making process of an individual, Decision Theory Framework would be applied in model creation.

Decision Theory Framework.

One of the important contributions of the Decision Analysis is identification and classification of decision making strategies, used by decision makers. Understanding differences of these strategies might assist in Entrepreneurial Decision modelling.

According to Russo and Shoemaker (1993) there are four approaches to decision making: intuitive judgements, rules and shortcuts, importance weighting and value analysis. While intuitive judgements and rules and shortcuts represent simplified, intuitive and default based decision strategies, importance weighting and value analysis assumes

decision making process with multiple criteria and objectives as well as different levels of importance of criteria.

Another approach to decision strategies classification is presented by Ranyard (2005) and includes lexicographic rule, satisficing rule, elimination by aspect rule and additive rule. Lexicographic rule means that the choice is made in favour of an alternative, which shows the best performance on the most important criterion, satisficing rule assumes certain minimum level which alternative should achieve on each of the criteria. Additive rule assumes a compensatory approach to decision making, what means that each alternative receives scores on each criterion depending on its performance.

Decision strategies vary depending on the importance of a decision and involvement of an individual in decision making process. A career choice definitely demands decision strategies of higher complexity and multiple criteria. One of the decision modelling approaches, which assumes high level of decision importance and multiple objectives is the so-called The Multi-Criteria Decision Analysis (MCDA).

Multi-criteria utility and value calculus for modelling multiple objectives and trade-offs evolved from the Decision Theory with Ramsey (1931) and von Neumann and Morgenstern (1947) as some of the main contributors. Multi-Criteria Decision Theory was created by Keeney and Raiffa (1976) and can be described by the formula: $V_i = \sum_{j \in J} w_j v_{i,j}$, $\sum_{j=1}^J w_j = 1$ where the value V of an alternative i is calculated as a sum of the alternative scores on each criterion v_j multiplied by w which is a scaling constant that equates units of value. J is an index set of criteria.

The Entrepreneurial Decision model would be based on the MCDA model, in which the value or attractiveness of alternative is evaluated based on added value approach: $V_i = \sum_{j \in J} w_j v_{i,j}$. The model takes into account three aspects of decision making process which are variety of alternatives and different criteria and their importance. It also includes the competing goals opportunity as the problem of competing goals is presented in existing literature on entrepreneurship in articles “Why entrepreneurs choose freedom over money” (2013) and others.

However, entrepreneurial decision also assumes consideration of risks of the entrepreneurial career alternative. According to the literature people become entrepreneurs in spite of low risk-adjusted returns (Hamilton, 2000). This can be partly explained by the entrepreneurs’ biased attitude to risk and overoptimism. The overoptimism according to Bazerman and Moore (2012) appears because of a cognitive bias due to which a person

overestimates his abilities and underestimates competition.

The uncertainty problem is a significant issue in case of entrepreneurship. One of the most obvious indicators of high uncertainty of an entrepreneurial career is the survival rate of the newly established companies during the first years of operation, which is 60% in the U.S., for example, according to the *U.S. Bureau of Labor and Statistics*.

The uncertainty problem might be added to the multi-criteria model as possible outcomes of each of the alternatives multiplied by the scenarios probabilities, what can be modelled as $v_{i,j} = \sum_{l=1}^L p_l a_{l,i,j}$, where $a_{l,i,j}$ – is the performance of alternative i under criterion j in case of scenario l , p_l is the probability of scenario l .

Taking into account the variety of decision making approaches, the Decision Maker might also apply Satisficing or Elimination by Aspect rules, which means that he/she has a certain minimum level of criteria, which he/she wants to achieve. This approach to career choice is also possible and in order to include it in the model, a constraint, presented as follows, would be added: $v_{i,j} \geq m_j$ what means that the value of an alternative i under criterion j should be not less than a certain minimum level m_j (assigned for the criterion j).

The important aspect of this model is the fact that the income from the entrepreneurial activity is not necessary compared to the wage as in the basic career choice models.

The next step is the inclusion of subjective and biased perceptions of the entrepreneurial sphere. Individual's perception of alternative performance on each of the criteria is subjective and often biased. The future income from entrepreneurship activity as well as the non-pecuniary benefits can be assessed unobjectively, what can be presented as follows: $v_{i,j} \neq v_{i,j}^*$, where $v_{i,j}^*$ is the real future performance of an alternative i under criterion j . $v_{i,j}^*$ is not equal to the perceived $v_{i,j}$.

Another important aspect is that the importance of each of the criteria w_j is different for each individual. We can model it as the importance of a criterion j for individual e is not equal to importance of criterion j for individual f for any e different from f : $w_{e,j} \neq w_{f,j} \quad \forall e \neq f$

The final model can be presented as follows: $ATE = \frac{1}{N_1} \sum_{i=1}^{N_1} y_{1,i} - \frac{1}{N_0} \sum_{i=1}^{N_0} y_{0,i}$

The outcome variable can be presented as a discrete value, as discussed previously or as a continuous value, calculated by the MCDA formula:

1) $y_i = 1$ if $V_{qi}^* = \max\{V_{1i}^*, V_{2i}^*, V_{3i}^* \dots, V_{Ai}^*\}$ and $y_i = 0$ otherwise, q – sphere of agriculture.

or

2) $y_{i,a} = V_{i,a}$ which means that the outcome variable for individual i and alternative a is equal to the attractiveness score assigned by individual i to alternative a . The ATE is calculated for one of the alternatives, in this case for the sphere of agriculture.

The value of alternative “agriculture” is calculated as follows:

$$V_a = \sum_{j \in J} w_j v_{a,j}, \quad \left\{ \begin{array}{l} v_{a,j} \geq m_j \\ v_{a,j} = \sum_{l=1}^L p_l a_{l,a,j} \\ v_{a,j} \neq v_{a,j}^* \\ w_{e,j} \neq w_{f,j} \quad \forall e \neq f \end{array} \right.$$

9. Experiment Background.

As it was clearly proven in the previous chapters, non-hereditary entrepreneurship promotion is crucial for the agricultural areas development. Non-hereditary entrepreneurs (in contrast to hereditary) often don't have previous experience in the agro-sphere. As a result, the knowledge about the industry and its opportunities might be limited. Lack of knowledge about industry opportunities, market perspectives, opportunities of business diversification and governmental support limits the number of entrepreneurs in the sphere and decreases the effectiveness of the agricultural entrepreneurship promotion. Another factor, which limits the number of new entrants in the agricultural sector, is the low *Attractiveness* of this business sphere.

“It (agricultural sphere) isn't viewed as an attractive alternative to other work sectors such as manufacturing, private, and public sector employment” (Sulaiman and Abdullah, 2013).

The concept of Attractiveness assumes not only financial characteristics of the sector perspectives but also non-financial benefits. A number of articles and reports emphasize the importance of such characteristics of the industry as prestige and image.

“Agriculture has never been considered to be a prestigious occupation....” (Kotler, 1990).

“Farming and farm support programmes... should improve the image of the sector” (Leavy, 2014)

“It also changed the social image of the sector. Many started to look upon rural areas as uninteresting wildernesses and became ignorant of agricultural processes” (Peters, 2012).

“We need to get young people excited about farming” (Fursdon, 2013)

The emotional perception, the image, status, prestige of the industry can be influenced by different approaches and policies. One of the approaches, which is used in business in improving the products and companies' image, is the so-called *Celebrity Branding*. Advertisers expect that the positive image of celebrity would pass to the product's or brand's or company's image (Lee and Thorson, 2008).

The experiment treatment applies an approach, which is similar to *Celebrity Branding*. The goal of the treatment is to inform the experiment participants about the famous people, involved in the agricultural business. The approach assumes involvement of celebrities in advertisement of agro-sphere, however, in contrast to a standard advertisement, the celebrities, participating in promotion, should be involved in agricultural sphere themselves.

The treatment is expected to influence the perceived non-financial benefits of the agricultural entrepreneurship through the increase in prestige, improvement of the image of the agricultural sphere. The purpose of the treatment is to simulate an approach, which can be applied in agricultural entrepreneurship promotion.

A classification of non-pecuniary attributes in entrepreneurial decision making process was developed previously and includes Esteem, Self-Realisation, Freedom, feeling of Belonging and Social Preference. The treatment is expected to influence the perception of the non-financial benefits of the agricultural sphere.

The advertisement of the agricultural sphere with celebrities through social media, for example, seems applicable and appears to be a possible way of the agricultural sphere promotion. In other words, the treatment models an instrument, which potentially can be applied.

10. Experiment Data and Methodology.

Data.

Students of business schools and students in universities, receiving business education, can be considered as one of the groups of population, which might be potential non-hereditary entrepreneurs in agro sphere due to several reasons. There is significant prove that knowledge and experience in the sphere of entrepreneurship increases the probability of becoming entrepreneur (Parker, 2009). Articles confirm correlation between business education and entrepreneurship development (Kurek and Rachwal, 2009) and show the significant role of business education in economic development (Doherty, 2006).

According to the existing research, entrepreneurship in agriculture needs more young people: “the younger lot want to innovate while the older lot don’t” (Bathurst, 2014).

The experiment was conducted in the University of Barcelona (UB), Faculty of Economics, with business students of the 2nd and 3rd year.

The experiment results have high external validity as the sample represents a group of population, in which the Policy Makers are interested as in potential future entrepreneurs in Agriculture. The experiment also has high internal validity, which is related to the causal effect of the experiment, and which assumes randomized allocation of participants into the Treatment and Control Groups. The UB students of the 2nd and 3rd years of education on each program were randomly divided by the University administration into two groups. All students of each program had the same courses and lectures. The Treatment was conducted in one group of each program, while the Control Groups were presented by the other group of each program.

The total number of experiment participants was 253 (120 in Treatment Group and 133 in Control Group). The average age of participants was 21 (age of participants ranged from 19 to 34 years). 117 out of 253 participants (46,3%) have at least one parent with high education. 130 (51%) participants have entrepreneurial parents or grandparents. 214 out of

253 (85%, vast majority) are considering entrepreneurial career in future. 140 participants (55%) are from Barcelona, 77 (30%) are from small cities in Spain and 36 (15%) interviewees are from other countries. 106 (41,9%) are female and 147 (58,1%) are male.

Methodology.

Experiment Design. The Treatment informs the experiment participants about the celebrities and famous people, involved in the agricultural business, what should improve the image and attractiveness of the industry.

In order to evaluate the effect of the Treatment, multicriteria additive value model, presented in previous chapters was applied: $V_i = \sum_{j \in J} w_j v_{i,j}$, where the value V of an alternative i is calculated as a sum of the alternative scores on each criterion v_j multiplied by w which is a scaling constant that equates units of value, in other words w is the relative criterion importance. J is an index set of criteria.

The experiment participants are presented with a number of alternatives (potential business spheres for entrepreneurial activities, which include the sphere of agriculture) and a list of criteria. In MCDA the “w” or the importance of a criterion is calculated according to the “swing weighting” procedure. The differences in values between the levels of a most and least preferred options on two given criteria (‘swings’) are considered and interviewees are asked to evaluate the relative value of the swings.

The evaluation framework can be characterised by the following formula.

$$V(a) = \sum_{j=1}^n w_j v_j(a) \quad \text{Where: } \begin{cases} v_j(\text{best}_j) = 100, \forall j \\ v_j(\text{worst}_j) = 0, \forall j \end{cases}$$

Where $V(a)$ is the value (Attractiveness) of the agricultural sphere, $v_j(a)$ is a partial score of agricultural sphere in terms of criterion j ; w_j is the relative weight of criterion j , $w_j =$ importance of the swing from $v_j(\text{best}_j)$ to $v_j(\text{worst}_j)$, $\sum_{j=1}^n w_j = 1$ and $w_j > 0$ ($j = 1, \dots, n$).

In order to apply MCDA methodology in agricultural sphere attractiveness evaluation, agriculture should be compared to other spheres of entrepreneurship activities as the Decision Maker, according to the model, should compare several alternatives.

Decision Alternatives. Decision Alternatives should cover the majority of business opportunities, which the Decision Maker might be considering in his/her career decision.

In order to achieve this goal, the list of these business spheres was created with the application of one of the most commonly used industries classification, The Industry Classification Benchmark (ICB) which is the industry classification taxonomy launched by Dow Jones and FTSE. According to the classification, the Industries are divided to: Oil and Gas, Basic Materials, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Utilities, Financials, Technology. The final list of alternatives, used in the experiment was shortened to six spheres: Constructions and Industrial Goods, Consumer Goods, Consumer Services and Health, Agribusiness, Finance and Technology.

Choice Criteria. The Multi-Criteria Decision Analysis assumes that the Decision Maker creates his own list of criteria, on the base of which he/she expects to make a decision. However, as the goal of the experiment is to measure the effect of the Treatment, the common list of criteria was used in the experiment questionnaire.

The list of criteria, which can be used by the potential entrepreneur was developed in previous chapter and represents six attributes: Level of Income that each of the sphere can provide, Level of Freedom (freedom in work schedule, in choosing the direction of business development, in choosing the market niche, the product positioning strategy, etc.), Level of Esteem (respect and recognition from other people), Self-realization, Social Preference (opportunity to help people, society and environment) and Belonging (feeling of belonging to a certain society or social group such as entrepreneurial or business society). The list of criteria consists of pecuniary factor – Income and five non-pecuniary factors.

Experiment Procedure. The experiments were conducted in September and October 2015 in the University of Barcelona. 20 minutes before the end of the class, the students were invited to participate in a non-compulsory experiment, with a financial compensation in a form of 10 euro lottery (per each 10 people in a group). As a result, only in one group four people decided not to participate and left the class, all the other students took part in the experiment.

At the beginning of the experiment, interviewees were asked to imagine that they are planning to become entrepreneurs and are evaluating the Attractiveness of different business spheres. In the first question interviewees are asked to evaluate six spheres

(Constructions and Industrial Goods, Consumer Goods, Consumer Services and Health, Agribusiness, Finance and Technology), giving 100 points to the most attractive one and all the other spheres from 0 to 100 according to the level of attractiveness. In the first question, interviewees are evaluating their subjective perception of the industries. The term “Attractiveness” is commonly used in MCDA interviews (Morton and Fasolo, 2009).

Then interviewees were asked to evaluate all the six spheres by six criteria (attributes): Level of Income, Freedom, Esteem, Self-realization, Social Preference and Belonging.

Each interviewee was asked to give 100 points to the sphere which provides the highest attribute score (for example, which sphere can provide the highest Income, from the student’s point of view), to give 0 point to the sphere which provides the lowest level of attribute (the lowest Income), and to give scores from 0 to 100 to all other business spheres. As a result, each business sphere received scores from 0 to 100 on all six criteria.

In this survey interviewees are providing their subjective perception of alternatives performance which doesn’t necessary correspond to the real performance, however in decision making process individual makes his/her decision according to his/her subjective assumptions, due to what the results of the experiment correspond to the goals of the research.

The last question of the questionnaire asks the interviewees to evaluate the swings importance. Students are asked to evaluate the importance of each criterion swing, meaning the importance of a change from 100 points to 0. The experiment participants were explained the swing weighting procedure in detail, were provided with an example and were suggested to ask questions if something was unclear.

Treatment. Both the Treatment and Control groups were given the same questionnaires. Before the survey, participants were shown a short presentation, which contained the overview of the industries. The presentation gave a brief explanation of each of the business sphere and several examples of the sphere’s representatives with their photos. The representatives were the Directors, CEOs or CFOs of some of the 100 biggest companies in a particular industry, ranked by turnover in 2014 (on Forbes, Construction Index and other websites). The companies, shown in the presentation, were taken from the end of the list (from 90 to 100 place) in order to present the companies that are not known to the

students. The pictures in the presentation, which represented the industries, were neutral as well as the photos of the industries representatives. The only difference was in the presentation of the Agricultural sphere. In the Control Group the Agricultural sphere presentation was neutral, while in the Treatment Group students were shown famous representatives of this business sphere.

The slides were demonstrating celebrities, who are involved in production of agricultural products. The list of celebrities included the world famous people (Charles, Prince of Wales, singer Sting, Elizabeth Hurley and Oprah Winfrey) and Spanish and catalan celebrities: José Antonio Iniesta, Antonio Banderas, Emilio Butragueño, Joan Llobet, José Miguel González, Miguel Bosé.

The aim of the treatment was to increase the attractiveness of the agricultural sphere of entrepreneurship through the advertisement of the sphere.

Treatment Effect Assumptions. The Treatment is expected to have several effects. The Treatment will influence the perceived prestige of the industry, causing such emotions as pride. Pride is evoked by appraisals of the self's accomplishments and rising social status (Tracy and Robins, 2004). This rise of the social status of Agricultural entrepreneurship activity will be the effect of the Treatment. The Treatment might also widen the perceived opportunities of the industry, possibilities of growth and brand building. I base this effect on an assumption that the sphere of Agriculture is often underestimated by potential entrepreneurs (Gurrieri, Lorizio and Stramaglia, 2014).

The Treatment is expected to improve the perceived Attractiveness of the Agricultural sphere of entrepreneurship. In other words, the Treatment should increase the average score, assigned to the Agricultural sphere Attractiveness. I also expect that the score assigned to the Agricultural sphere on criterion "Esteem" would be higher in the Treatment Group. The book "Modern Human Relations at Work" (Hegar, 2012), proves that "prestige carries with it respect and status and influences the way people talk and act around individual". The Treatment should also influence the criterion "Belonging", as the criterion assumes belonging to a certain society, business group or environment, which is connected to this particular sphere of business. The fact that celebrities belong to the Agricultural business society should increase the average performance of the Agricultural sphere on this

criterion. The Treatment might also influence other criteria and might cause the change in average importance of the criteria.

Experiment Limitations. The experiment design includes the Multiattribute Value Model, based on the MCDA approach, however there is a number of differences with this Decision Theory approach, what might add complications to the experiment results analysis.

Firstly, the Multi-Criteria Decision Analysis methodology assumes that the Decision Maker creates his own list of criteria. This approach, however, would not allow quantitative data analysis, due to what a common list of criteria was used in the experiment. Interviewees don't make the list of attributes themselves, but are presented with the list of criteria groups. As a result, interviewees might face difficulties in evaluating the importance of criteria as criteria explanation and time allocated for the questionnaires is limited.

The second main difference with the MCDA approach is that interviewees are not presented with the feedback information. Each individual is not shown the results of the swing-weighting procedure, interviewee is not shown the cumulative weight of different groups of factors and is not presented with the Hiview software results, which show how the alternative's score changes with the change of the swing importance. The feedback information is an important instrument in decision facilitation. According to the Decision Theory, the cognitive abilities of the Decision Maker are limited, and decision process is often biased (Thaler and Sunstein, 2009). The MCDA feedback procedure helps in identifying biases in criteria importance evaluation. As the experiment procedure doesn't assume any feedback, the results of the experiment might be biased.

The last difference of the experiment procedure with the MCDA approach is that interviewees are not personally interested in the results of the experiment (MCDA application assumes that interviewees receive assistance in alternatives evaluation through MCDA methodology and software application).

11. Experiment Results Discussion.

Treatment Effect. If the Average Treatment Effect is considered from a binary perspective so we compare only the number of experiment participants who assigned the Agricultural sphere 100 points of attractiveness, then the results can be presented in the following table (Table 3).

Table 3. Agricultural Sphere as the Most Attractive Alternative.

	Treatment	Control	Difference
Number of 100 points to Agriculture	15	1	14
Number of 100 points (in %)	12,5	0,75	11,75
Number of participants	120	133	13

$$\text{The ATE} = \frac{1}{N_1} \sum_{i=1}^{N_1} y_{1,i} - \frac{1}{N_0} \sum_{i=1}^{N_0} y_{0,i} = \frac{1}{120} 15 - \frac{1}{133} 1 = 0,125 - 0,0075 = 0,1175.$$

In other words, in the Treatment Group with 120 interviewees the number of students who gave Agricultural sphere the highest score is 15 times more than in the Control Group with 133 participants. The Average Treatment Effect is the difference in percentage of the interviewees who evaluated the Agricultural sphere as the most attractive sphere of entrepreneurship. In the Treatment Group the percentage of such interviewees was 12,5%, while in the Control Group it's 0,75%. The difference (11,75%) proves the effect of the Treatment.

If y_i is evaluated as a continuous variable, then ATE can be calculated as $\frac{1}{N_1} \sum_{i=1}^{N_1} y_{1,q,i} - \frac{1}{N_0} \sum_{i=1}^{N_0} y_{0,q,i}$, where $y_q = 0, \dots, 100$. N_1 is the number of units in the Treatment Group, N_0 is the number of units in the Control Group, $y_{1,q,i}$ is the evaluated Attractiveness of the sphere of agriculture (q) by individual i in the Treatment Group and $y_{0,q,i}$ is the evaluated Attractiveness of the sphere of Agriculture (q) by individual i in the Control Group.

The ATE = $\frac{1}{N_1} \sum_{i=1}^{N_1} y_{1,q,i} - \frac{1}{N_0} \sum_{i=1}^{N_0} y_{0,q,i} = 44,93 - 23,8 = 21,13$. The increase in the level of Attractiveness of the Agricultural sphere in the Treatment Group is 21,13%. In order to check the statistical significance of the difference in average attractiveness score the t-test was used. Welch's Two Sample T-test results prove that the difference in the average Attractiveness score (44.93 average score for the Treatment and 23.8 Control

Groups) is statistically significant (p -value = $2.197e-07$ with 95 percent confidence interval 13.34019 - 28.91746).

Both approaches show that the Treatment increases the Attractiveness of the Agro-sphere and increases the number of experiment participants who evaluate Agriculture as a business sphere with the highest value among all the presented alternatives. So, the change in the average Attractiveness score of the Agricultural sphere is a considerable indicator of the usefulness and applicability of the modeled instrument of Agro-sphere entrepreneurship promotion.

Criteria Importance and Alternative Perceived Performance in the Treatment and Control Groups.

The Treatment and Control Groups demonstrate different results of the mean level of Attractiveness of the Agricultural sphere as well as the Agricultural sphere performance on a number of criteria.

The Table 4 presents three groups of results for the Treatment and Control Group. The table presents the Attractiveness score, which the experiment participants assigned to the Agricultural business sphere when they were asked to directly evaluate the level of Attractiveness of all the six business spheres presented. Secondly, the table presents the perceived average performance of the Agricultural sphere on six criteria.

As we can see from the table, Treatment influenced Agricultural sphere performance in case of every criterion, what shows a balanced effect of the Treatment and a stable change in perception of the Agricultural sphere.

Criterion Belonging shows the lowest increase from the Control to the Treatment Group, what might be a sign that students don't expect to have a strong feeling of belonging even to the regional agricultural producers.

The second smallest change in perceived performance of the Agricultural sphere is on criterion Income. The perceived mean performance increased only by 6,31 points. The Treatment was expected to influence the perception of non-hereditary benefits of the sphere so this result was expected.

Table 4. Agriculture Attractiveness, Scores and Criteria Weights.

	Treatment		Control		Difference
	Mean	Std. Dev	Mean	Std. Dev.	Mean
<i>Attractiveness</i>	44,93	34,6	23,8	27,4	21,13
<i>Performance</i>					
<i>Income</i>	23,3	28,55	16,99	26,4	6,31
<i>Freedom</i>	57,08	37,75	44,05	39,6	13
<i>Esteem</i>	41,49	39,32	23,16	33	18,3
<i>Realisation</i>	56,73	40,36	36,83	36,4	20
<i>Social</i>	70,72	33,8	54,06	39	16,7
<i>Belonging</i>	39,33	36,21	34,56	36,5	4,8

The Agricultural sphere performance improves significantly on criteria Esteem and Realization (by 18,3 points and 20 points respectively). The strong increase on Esteem in Treatment Group can be explained directly by the influence of celebrities. If famous and reach people are involved in the industry then this industry can't be evaluated as a "non-prestige" or "non-fashionable" or "non-significant". Another conclusion, which can be made, is that the Treatment has a stable effect: the mean increase in the evaluated Attractiveness of the industry can be explained by the mean increases in the industry performance on criteria.

From the results, we can assume that the perception of the Agricultural industry in the Control Group is biased. The main goal of the Treatment was to inform the experiment participants about successful agro-sphere activities, performed by famous people. A significant improvement of the Agricultural sphere performance on criteria Realization and Freedom in the Treatment Group is another sign of experiment participants' limited knowledge about the industry opportunities and perspectives.

Criteria Importance and Alternative Perceived Performance Depending on the Agro-sphere Attractiveness.

The previous chapter presented a model of potential entrepreneur's decision process. One of the model conditions was: $w_{e,j} \neq w_{f,j} \forall e \neq f$, according to which the importance of criteria is different for different groups of population. Applying this result to the experiment, we can conclude that the potential entrepreneurs, interested in Agricultural sphere might have different preferences if compared to potential entrepreneurs who are more attracted to other business spheres. Knowledge about the preferences of the group of population who are attracted to Agriculture might provide useful information for the Policy Maker.

In order to further discover the issue, I've divided the data in Treatment and Control Groups into two sub-groups, according to the alternative preferences: group which would be called MF (more than 50 points group) gave the Agro sphere 50 points of Attractiveness or more, group LF (less than 50 group) gave Agro sphere less than 50 points.

The results for the four subgroups are presented in the following table (Table 5).

The performance of the Agro-sphere in the Treatment Group is higher than in the Control Group in case of all subgroups. In other words, the majority of experiment participants, regardless of the final score given to the Agro-sphere, were influenced by the Treatment to a certain extend.

The greatest difference between MF and LF groups in both Treatment and Control is the difference in performance of Esteem and Realization. In other words, students, who evaluated Agricultural sphere as more attractive assumed that Agro-sphere can provide significantly high level of Realization and Esteem, what provides additional confirmation that non-financial criteria might play greater role in potential non-hereditary agricultural entrepreneur's decision making process.

The differences between MF and LF subgroups in Control and Treatment Groups are different. In Control Group the smallest change in performance is on criterion Belonging (5,13 points average change). That might be connected with the fact that meaning of criterion Belonging was not clear for all the experiment participants, as in several Control Groups students asked to explain the meaning of the criterion Belonging in greater details.

Table 5. Attractiveness Based Industry Performance and Criteria Weights.

	Treatment			Control		
	MF	LF	Difference	MF	LF	Difference
<i>Performance</i>						
<i>Income</i>	26,94	19,41	7,52	23,97	14,6	9,38
<i>Freedom</i>	59,35	54,64	4,72	51,91	41,35	10,56
<i>Esteem</i>	55,32	26,71	28,62	33,97	19,44	14,53
<i>Realisation</i>	75,16	37,03	38,13	56,29	30,15	26,14
<i>Social</i>	74,84	66,31	8,53	64,56	50,45	14,1
<i>Belonging</i>	44,27	34,03	10,24	38,38	33,25	5,13
<i>Importance</i>						
<i>Income</i>	73,47	86,05	-12,58	75,41	87,76	-12,35
<i>Freedom</i>	68,71	68,4	0,31	73,68	66,25	7,42
<i>Esteem</i>	61,05	64,4	-3,35	66,18	71,56	-5,38
<i>Realisation</i>	84,02	83	1,02	90,15	85,11	5,06
<i>Social</i>	54,68	46,43	8,25	48,68	46,69	2
<i>Belonging</i>	40,65	29,07	11,58	16,47	32,65	-16,18
Total number,	62	58		34	99	
%	51,7%	48,3%		25,6%	74,4%	

Criterion Esteem demonstrates the second lowest average performance in LF subgroup of both Control and Treatment Groups, which means that for a number of experiment participants the Agricultural sphere is persistently perceived as a non-prestigious business sphere. The difference between the MF subgroups in the Treatment and Control Groups is 21,35 while the same difference for the LF subgroups is 7,27, what might mean that individuals who are more attracted by the Agricultural sphere are also more influenced by the Treatment.

Also in the Control Group, the MF subgroup demonstrates that Agriculture received the highest score on criterion Social Preference (64,56) compared to the other average scores, which the sphere received (23,97 on Income, 51,91 on Freedom, 33,97 on Esteem, 56,29 on Realisation, 38,38 on Belonging). That might be a sign that in the Control Group the students who evaluate the Agricultural sphere as more attractive, highly value it for opportunity to contribute to the society and the environment.

The greatest difference among MF and LF subgroups in the Control Group is on the criterion Realization (26,14 points difference). That can be explained by the fact that experiment participants, interested in the Agricultural sphere are attracted to it mostly by the opportunity of Self-realization and by other non-financial benefits, which the sphere might offer.

The Treatment Group demonstrate the greatest difference between MF and LF subgroups for criteria Esteem and Realization, what again points attention to the importance of these two criteria in decision making process of potential entrepreneurs in the sphere of Agriculture.

The table with MF and LF subgroups main goal is to find out why individuals might be attracted to the Agricultural sphere. One of the main observations is the fact that non-pecuniary factors might play more significant role than the financial benefits. In the MF subgroup of the Treatment Group we can see that the Agricultural sphere received the highest mean scores on criteria Realization (75,16) and Social Preference (74,84), while on criterion Income the average score was 26,94 points. Similar situation is observed in the MF subgroup of the Control Group: Social Preference and Realization received the highest average scores (64,56 and 56,29 respectively), while on criterion Income the average score is equal to 23,97. Taking into account that in the MF subgroups the Attractiveness score of the Agricultural sphere was 50 points or higher, we can conclude that the expected Income doesn't explain the level of Attractiveness of the sphere in case of Agro business.

12. Conclusion.

The Paper proves the importance of entrepreneurship in agriculture promotion and demonstrates the shortcomings of the existing instruments of agro-business motivation.

The Paper justifies the Decision Theory (DT) application in agricultural entrepreneurship motivation and considers how DT approaches can be implemented in agricultural entrepreneurship promotion. The Paper proves importance of diversification of hereditary and non-hereditary entrepreneurs and describes possible ways of NUDGE Theory application.

The Paper also models a policy effect on entrepreneurial decision, creates a classification of entrepreneurship determinants, applicable in experiment devoted to policy effectiveness assessment. The Paper divides the entrepreneurial determinants classifications into two groups, according to the perspective: Policy Maker's or Decision Maker's. The differences between two perspectives decrease the effectiveness of policies aimed at entrepreneurship in agriculture motivation. The Decision Maker's perspective can also be divided into Factors and Gains subgroups. The final decision is made based on the Gains consideration. Applying top-down and bottom-up approaches, using existing literature on entrepreneurship criteria and Maslow hierarchy of needs and his later works, a new classification of entrepreneurship Gains was created and consists of pecuniary and non-pecuniary factors: realization, freedom, belonging, social preference and esteem.

The classification was checked by applying it to 120 reasons of choosing entrepreneurial career, described by real entrepreneurs. 116 out of 120 reasons were allocated to one of the criteria groups.

The model of a policy effect on entrepreneurial decision is created applying Average Treatment Effect formula. The Paper suggests different approaches to outcome variable y_i depending on the Decision Maker. The hereditary farmer's decision to become entrepreneur should be modeled as a binary variable, while the non-hereditary entrepreneur's decision should be modeled as a discrete variable.

In the model, the outcome variable is calculated as a sum of criteria performance multiplied by the criteria weight: $V_a = \sum_{j \in J} w_j v_{a,j}$. The model includes the minimum level of performance of alternative on criterion: $v_{a,j} \geq m_j$, the biased perception of alternative performance $v_{a,j} \neq v_{a,j}^*$, the risks $v_{a,j} = \sum_{l=1}^L p_l a_{l,a,j}$ and the difference in criteria importance for different groups of individuals $w_{e,j} \neq w_{f,j} \forall e \neq f$.

The experiment on non-pecuniary method of agricultural entrepreneurship promotion has demonstrated significant results. The Treatment Effect shows that the number of

interviewees who gave agricultural sphere the highest score in the Treatment Group was 15 times more than in the Control Group. The percentage of the experiment participants who evaluated agricultural sphere as the most attractive was 12,5%, while in the Control Group the percentage of such interviewees was 0,75%. The Average Treatment Effect, also shows that the attractiveness score, assigned to the agricultural sphere is on average 21,12% higher in the Treatment Group, the t-test shows that the difference is statistically significant.

The Treatment increases the average score of the agricultural sphere attractiveness and increases the perceived performance of the alternative on all criteria, presented in the experiment, what demonstrates a stable effect of the Treatment. The greatest increase in performance of the agricultural sphere is on criteria *esteem* (by 18,3 points) and *social preference* (16,7). The significant increase can be explained by the change in perception of the agricultural sphere and debiasing effect of the Treatment. The change in perceived performance of the Industry, based on the information gained from the experiment proves the model assumption $v_{a,j} \neq v_{a,j}^*$ according to which the real performance of the sphere is often underestimated by the Decision Maker.

Dividing the data in Control and Treatment Group into subgroups based on the attractiveness score of the agricultural sphere (50 points threshold) shows that interviewees, evaluating the agricultural sphere as more attractive give lower importance to the criterion *income*, what proves the assumption that the importance of criteria, applied in entrepreneurial decision, is different for different groups of individuals: $w_{e,j} \neq w_{f,j} \quad \forall e \neq f$. Those experiment participants, who gave agricultural sphere greater attractiveness score also gave the Industry much higher scores on criteria *realization* and *esteem*, while the perceived level of expected *income* didn't increase to the same extent. This result indicates that income is not a determining factor and has a lower importance for the Decision Makers who consider agricultural sphere as attractive.

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