The Double Way between Financial Indicators and Innovation Investment Behavior for the Romanian Agri-Business Actors: Entrepreneurship and Innovation

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Abstract

Within a world dominated by risks and uncertainties, the agriculture sector has limited options to develop and one of these is the innovation, as in many other economic sectors. The actors of this sector behave differently and their choices linked to innovation should have always an economic basis. The investments decisions in capital expenditure, better quality of the working capital, human resources or processes are influenced by different financial indicators obtained as liquidity level or rentability expressed through return on equity or return on assets. The study is based on a qualitative methodology related to a field questionnaire for 201 companies. A good position of liquidity will determine the farmers to invest in a better quality of the raw materials and technology connected to them. The entrepreneurs who get better rentability rates will invest in development of the internal processes and in classical form of innovation represented by capital expenditure.

Key words: innovation, agriculture, behavior, financial indicators
J.E.L. classification: G31, Q12, Q16

1. Introduction

The innovation is one of the main drivers for the company performance, including the emerging markets like Romania. Even it has been emphasized within market studies that the research and development activity (R&D) is a central development point for new products, the risks and high costs are barriers for investments for innovative solutions in such countries. (Ahmed *et al*, 2020) The approach of the innovative management and of the need of utilization at strategic level are imposed by two directions of action: business development and addressing of the risks through limitation of the adverse effects. (Cambalikova *et, al,* 2021). This new approach in agriculture is dominated by entrepreneurship used under restrictive conditions due to the climate changes and regulations imposed by authorities regarding environment sustainability. Even the interest of farmers for improving the resilience of the business to climate changes is increasing, they are more focused on short-term results. Following this purpose, the investment process should be based on innovation packages for covering the needs for both productivity and climate resilience which are connected. (Dossou-Yovo et al, 2024, p.7) The resources allocation process within the overall range of resources is very important for conducting the development process in agriculture. The famers have to respond to the challenges of the very complex environment they work with. The investments in Research and Development (R&D) represent the basis of innovation, environment protection, use of energy and financing facilitation, contrary with the use of natural resources which have a negative impact on the green development of the agriculture production. (Ren et al, 2023, p.7) The innovation is negatively correlated with the big investment, especially in financial resources. (Kangogo et al, 2021, p.1)

The rationalization and bureaucracy are two main elements of the modern agriculture. The social behavior is dominated by the economical one. The businesses are conducted in an extremely rational way, the purpose being the cost optimization for getting higher profits. This type of entrepreneurship has benefits for the economic side of activity, but could have negative effects on social and environment. (Gittins *et al*, 2022, p.502) The big farmers with more available resources in term of

land and technology are more suitable to implement innovative solutions like digitalization (Cheng *et al*, 2024, p.11), especially for processes optimization.

Considering the main goal of the farmers for obtaining profit, the major climate changes in the last years, the increased bureaucracy related to environment sustainability, the relationship between innovation and entrepreneurship, the aim of the present study is to emphasize the link between the financial indicators related to liquidity and returns and the investment decisions for innovative solutions within the Romanian farms and vice-versa.

One of the main questions for entrepreneurs is related to the options for growing the business and the resilience of it against crises which can affect the development or even can conduct to bankruptcy. Considering the domination of the competition at global level, the connections and the low level at barriers, it is compulsory to apply an innovative management at strategic level for performing within a very dynamic environment. Therefore, the present study assesses the behavior of the farmers for making innovation investments depending on the different level of the profitability – return on assets and return on equity - and financial position – current ratio. The types of innovation taken into consideration are connected to capital expenditure – production processes/equipment, drones, weather stations; processes – services for satellite tracking, financial processes; working capital improvement – technologies for agriculture inputs; human resources – people involved in the digital area. On the other perspective, we can conclude about the impact of the innovative management on the financial results.

The level of innovation awareness of the business environment from Romania is still very low compared with other countries, especially from the western part of Europe. This study is aiming to increase this level and to contribute to the general development through innovation. The farmers are still focused on the traditional innovation methods which related to equipment and agriculture inputs. The processes improvements, especially for finance, and the services related to digitalization and data integration can improve a lot the control over the production process and costs as well. The farmers can react very quickly and in a very efficient way for addressing the production risks (diseases, adverse factors) using modern monitorization systems. On top of the contribution at farm level, the results of the study will give clear indication regarding the state approach for the sustaining measures for the agriculture sector. The subsidies or the grants should give incentives to farmers for systems or processes for which they are not opened to take risks or to invest on short-term due to the higher costs involved.

The study concluded that the farmers are aware about the innovation importance and benefits, but they do not take actions to be informed about the new technologies. On top of the information sources preferences are the events or the visits organized by suppliers. The research from their own initiative through internet is on the second place. Depending on the profitability obtained and expressed through return on assets and return on equity, they prefer to invest in capital expenditure, like agriculture equipment and drones. The short-term cash availability conducts the farmers' decisions for improving the quality of the agriculture inputs used. Even these materials are more expensive due to high quality level, they consider this decision in a positive way due to cash availability. The implementation of better financial processes is done by farmers which have a good return on equity, meaning a good return on the capital invested in the business. For the rest of factors considered within the study – services for satellite tracking, weather stations and people development in the digital area – no correlations were found with the financial determinants.

The study will be completed with sections related to specific literature for the analyzed factors, research methodology, findings and conclusions.

2. Literature review

Within the methods for achieving innovation, it can be defined: digital technology, considered a dominant factor (Cambalikova *et at*, 2021), long-term investments in technological equipment with positive impact on labor and equipment productivity and performance and on production capacity improvement (Juris *et al*, 2020); development of human resources, which is considered a very important factor for both operational processes and overall business (Juris *et al*, 2020). The investmnet in processes improvement is not enough and it should be sustained by new production capabilities - tangible elements. (Ahmed et al, 2020) The innovations expressed by technical or

business model improvments can be integrated using the new technologies. In this context, digitization can be considered as main driver of innovation (Niewohner *et al*, 2020). Not only the investments in tangible elements are necessary. The sustainability can be obtained by focusing on the non-tangible assests as well, which are the basis for sustainability increase (Skare *et al*, 2021). The human resources development is a key factor for improving the internal processes by integrating all the activities. Consistent budgets should be allocated for necessary competences and skills of the employees to be in line with the market trends and requests. Therefore, the overall competitveness of the company will increase (Ahmed et al, 2020).

Considering the new trends in the sustainability area, the most common concepts used today in the modern agriculture are: agriculture entrepreneurship, climate smart-farming, green innovation. They are imposed by both needs of farmers and authorities, each of them having their own interests as stakeholders of the agriculture sector.

The new normal represents the transformation for the implementation process considering the sustainability of the agriculture. (Lang *et al*, 2023 p.1) The green innovation is a key driver for economic and environmental development. It can be stimulated by the awareness related to environment, but also by the health concerns. (Chi, 2022, p.1) Also, climate-smart agriculture innovation has become a concept that should be integrated in an accelerated way. The level of usage is very low due to the lack of several factors as knowledge, finance processes, equipment, quality of the agriculture inputs. (Dossou-Yovo *et al*, 2024, p.1) The agriculture expansion is influenced by the lack of investment in technology and research. (Ren *et al*, 2023, p.8)

As the resources are becoming an issue at global level, the farmers are obliged to use more innovative systems for increasing the productivity and for facing the volatility of the yields and prices. The agriculture entrepreneurship is driven by the structural social capital (Lang *et al*, 2023 p.10), considering the institutional requests related to sustainability. The macro-economic policies have a direct influence on the agriculture sector development and vice-versa. The strategies for innovation management should be aligned at all levels. (Taishykov *et al*, 2024, p.6). The farm technologies in term of equipment should be used in the environment protection direction, this being a very important goal of the modern economies. (Chi, 2022, p.10)

The farmer decisions are influenced by the lack of information. They should be in direct contact with the external environment for getting a higher level of qualitative information (Taishykov *et al*, 2024, p.1). In general, the famers use to copy the success models they observe around them. The technological innovations should be facilitated and diffused in a proper way and the readiness level should be the same for all relevant dimensions of it. This is the only method to accelerate the innovation implementation process. (Stræte *et al*, 2024, p.7)

Even there is an important development for the model innovation and entrepreneurship, it is still in the initial phase, especially in the rural areas. This combination has a positive effect on the business growth and a big influence over the regions near-by with similar characteristics. (Pan *et al*, 2023, p.15) The digitalization is correlated with the agriculture entrepreneurship (Cheng *et al*, 2024, p.1) as it offers resources for optimization and for the increase in control. The digital skills are a good driver for attraction external resources as financing or technology as the good perception about them is both from internal and external side of the organizations. The results can be increased using a good combination between digital and financial skills. (Cheng *et al*, 2024, p.11) Also, there is a direct connection between the technology market value and the regulatory acceptance. Between the two of them should be a direct correspondence and they should go in the same direction. (Stræte *et al*, 2024, p.7)

The farmers should take care of the institutional environment when they take business decisions for development as the focus is more and more on environment sustainability. (Gittins *et al*, 2022, p.502) The green innovation is increasing overall, but the impact in the emerging economies as Romania is still low. The conversion from conventional to green production which involves innovation can be done just using better the available resources as technology, finance, human. (Chi, 2022, p.10) The involvement of all actors should be at the same level: farmers, authorities, research centers and universities. (Shi *et al*, 2023, p.15)

The capacity of the farms from both technological and operational point of view are still the main drivers for increasing the production, but they do no influence the environment protection. (Chi, 2022, p.10) The climate change is a motivating factor for developing the green agriculture. (Ren *et*

al, 2023, p.1) The production increase is sustained by the energy consumption, but is very important to use sustainable energy sources, as the quality of these can influence into a negative way the green agriculture. The resilience can be obtained by using more efficient energy solutions. (Ren *et al*, 2023, p.9) The green agriculture system sustained by innovation had a rapid growth during 2010 and 2019, with a higher influence of the companies compared with the individuals, while the influence of the science and academic environment was weak. (Shi *et al*, 2023, p.1) The resources excess does not have a positive impact on the green agriculture. (Ren *et al*, 2023, p.1) The optimization through irrigations, organic pesticides and measures for soil-preventing should be considered priorities for the near future. (Shi *et al*, 2023, p.15)

The realistic view of the business identified by the lack of optimism is in direct correlation with the digital skills of the farmers. (Cheng *et al*, 2024, p.11) "Smart-farming" technologies are part of innovation which is increasing rapidly. The drone-based supervision is one technology that should be studied and applied within this new concept. Each step of development process for innovation overall should be supported by adequate and customized technological innovation, quantified using more elements as technology, availability, standards and laws, social impact, company maturity. (Stræte *et al*, 2024, p.7) The drivers for climate-smart agriculture are represented by innovation, degree of risk-taking and proactivity. A need for training has been identified, but this should be customized for each farmer and for each one of the three dimensions. The farmers adopt more multiple methods in the same time. (Kangogo *et al*, 2021, p.10) The unskilled-labor influences in a negative way the proactivity in term of climate-smart agriculture. (Kangogo *et al*, 2021, p.10)

3. Research methodology

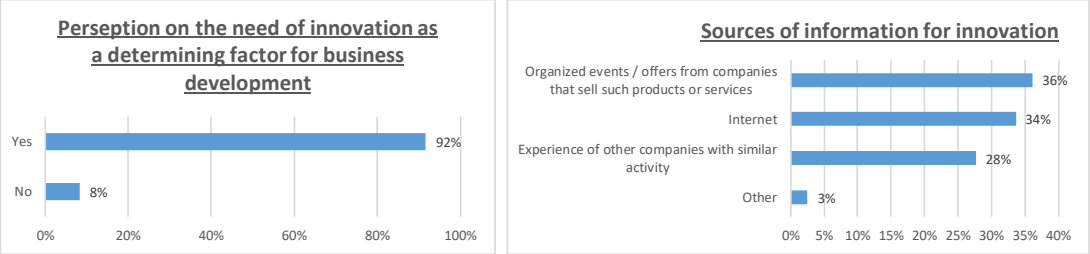
A questionnaire survey with closed questions was performed for collecting data of 201 companies in Romania. The sampling was chosen using a non-probability method with a non-sampling geographic criteria. The farmers are located in all the districts of Romania, covering almost all the country. The purpose of the questions was to observe the focus of the farmers for innovation investments: services for satellite tracking (M1); production processes/equipment (M2), drones (M3), weather stations (M4); technologies for agriculture inputs (M5); people involved in the digital area (M6); financial processes (M7). Other questions were in connection with the perception of the need for innovation, the sources of information related to innovation and the intention of the farmers to take decision and to invest in innovation. Additionally, the financial data for year 2021 were studied. The financial indicators analyzed were: current ratio (current assets / current liabilities), return on assets (operational result / total assets) and return on equity (net profit / equity).

The model was empirically validated through ANOVA-F method together with robust test of equality of means and test of homogeneity of variances. The SPSS software was used for performing the tests.

4. Findings

Even the Romanian economy is characterized by the domination of the medium and weak technologies, with a low knowledge request and underdeveloped innovation culture sector (Ionescu, 2015), 92% of the respondents consider that innovation is a determinant factor for the business development (*Figure no.1*). The low knowledge request was confirmed by the answers received to the question concerning the sources of information for innovation. The farmers wait to receive information from service suppliers which promote their products. The internet research is on the second place on their preferences. The activity and results of companies with similar object of activity are not an inspiring source or them, being not a main preference (*Figure no.1*). The good level of perception of the innovation need and advantages correlated with the low interest for finding out solutions reflect the high level of barriers for proceeding with the investments in new technologies and processes. These barriers are related to the perceived risks and related costs of them, but the entrepreneurs should look ahead, anticipate the changes and decide stategies for passing the turbulences caused by changes. (Cambalikova *et al*, 2021)

Figure no. 1 Perception on the need of innovation and the source of information for it

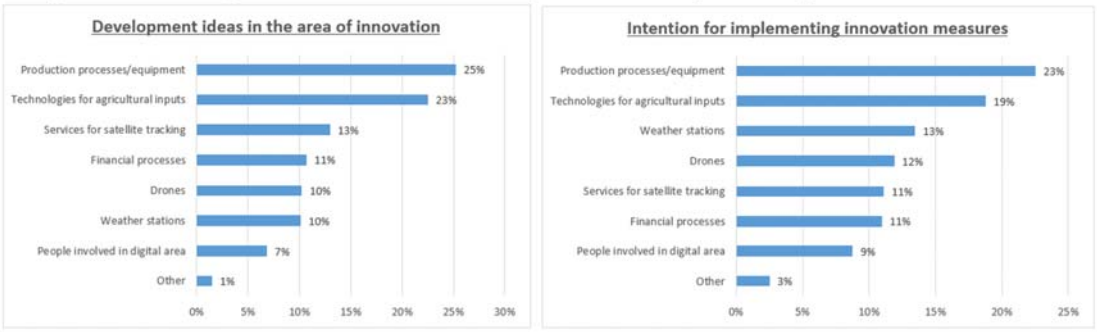


Source: Author's own research

The main actors of the agriculture sector behave into a traditional way of doing investments for innovation. They are focused on using new and modern equipment and improving the inputs technologies, like better inputs (fertilizers, seeds, crop protection materials) or better production processes (e.g. no-till technology). The services for satellite tracking are used quite a lot and this fact can be explained by the need of farmers for working efficiently and for applying inputs exactly in the area when it is really necessary. Using this technology, they can obtain an efficiency increase along cost savings with people, fuel, etc. The internal financial management processes are considered important, but not at a high level. The need of using proper financial approach is very high due to the risks of the sector coming from weather conditions, volatilities for production yield and prices. Other investments as drones and weather stations have a low level of interest. Even the digitalization is considered a dominant factor on the innovation, this is the last on top of preferences. They do no prefer to internalize the IT activity. (*Figure no.2*)

The intention for future decisions is not so different compared with what the situation of today. They do still prefer the classical investments in equipment and high-quality working capital. Next is the interest for weather stations and drones. The digitalization is still on the last place. Neither today and not in the future, the intention is not to improve the activity using people specialized in the digital area. The efficiency of the innovation activity of the farms which act in a very dynamic context is possible only under the condition of implementing in time of development projects which are able to satisfy the requests of both external and internal environments. The companies should contribute to the development of the own potential on a long-term perspective (Khrystyna et al, 2021). The farmers should have a higher level of internal motivation for searching new technologies and for getting out from the traditional way of doing things as the potential of the sector is very big and the results are under it, compared with other similar activities from different countries in Europe.

Figure no. 2 Actual focus on innovation idea and future intentions for development



Source: Author's own research

The influence of the financial indicators over the decisions to invest in innovation was tested using ANOVA-F method. The results are presented in the Table no.1.

Table no. 1 ANNOVA-F

ANOVA – F	M1	M2	M3	M4	M5	M6	M7
CR	0.394	1.310	0.839	0.589	3.126*	0.196	0.570
ROA	1.190	2.106***	2.111***	0.628	0.822	0.279	0.661
ROE	1.466	0.961	0.961	0.418	1.344	1.080	2.050***

Source: Author's own research. SPSS results.
***p < 0.01, **p < 0.05, *p < 0.1

The results reflect a correlation between the CR (current ratio) and technologies for agriculture inputs (M5); ROA (return on assets) and the investments in production processes/equipment (M2) and drones (M3); ROE (return on equity) and financial processes (M7). The services for satellite tracking, weather stations and involvement of people in the digital area (M6) are not correlated with financial determinants.

The related Robust test of equality of means and Test of homogeneity of variances are presented in the Tables no. 2 and 3.

Table no. 2 Robust tests of equality of means

Robust Tests of Equality of Means		CR		ROA		ROE	
		Statistic	Sig.	Statistic	Sig.	Statistic	Sig.
M1	Welch	0.330	0.857	1.147	0.339	1.260	0.291
	Brown-Forsythe	0.368	0.831	1.193	0.315	1.470	0.213
M2	Welch	1.287	0.287	2.193	0.075	0.949	0.439
	Brown-Forsythe	1.294	0.278	2.106	0.082	0.961	0.430
M3	Welch	0.764	0.553	2.376	0.057	0.985	0.419
	Brown-Forsythe	0.841	0.503	2.113	0.081	0.960	0.431
M4	Welch	0.758	0.557	0.614	0.653	0.385	0.819
	Brown-Forsythe	0.624	0.646	0.629	0.643	0.418	0.796
M5	Welch	3.462	0.014	0.829	0.510	1.326	0.266
	Brown-Forsythe	3.277	0.014	0.822	0.512	1.344	0.255
M6	Welch	0.190	0.943	0.245	0.912	0.949	0.439
	Brown-Forsythe	0.188	0.944	0.279	0.891	1.080	0.368
M7	Welch	0.920	0.459	0.866	0.487	2.985	0.023
	Brown-Forsythe	0.608	0.658	0.611	0.620	2.054	0.089

Source: Author's own research. SPSS results

Table no. 3 Test of Homogeneity of Variances

Test of Homogeneity of Variances		M1	M2	M3	M4	M5	M6	M7
CR	Levene statistic	1.353	1.087	2.832	3.905	5.807	0.798	3.026
	Sig.	0.252	0.364	0.026	0.004	0.000	0.528	0.019
ROA	Levene statistic	4.710	2.805	9.329	2.324	2.982	1.009	3.433
	Sig.	0.001	0.027	0.000	0.058	0.020	0.404	0.010
ROE	Levene statistic	4.953	0.325	4.030	1.230	2.432	3.832	11.792
	Sig.	0.001	0.861	0.004	0.300	0.049	0.005	0.000

Source: Author's own research. SPSS results

5. Conclusions

The study applied a statistical method for identifying the correlation between the financial determinants as current ratio, return on assets and return on equity, and different innovative tools available for farmers. A good current ratio will encourage the entrepreneurs from the agri-business sector to use better technologies for agriculture inputs. The standard investments in innovation

represented by technologies for production and equipment, along with drones, are correlated with a good return on assets, while the financial processes have a significant relationship with the return on equity. All the others analyzed investment options as services for satellite tracking, weather stations and involvement of people in the digital area are not influenced by the financial determinants and vice-versa.

The farmer behavior is to invest in better inputs if they consider that they have enough resources on short-term, meaning good financial position presented as current ratio. On the other hand, the good position for liquidity will allow them to purchase better products. The spending on sustainable technologies for production processes, equipment and drones will contribute to the overall development of the farms. The investment in this area is encouraged by good levels of return on assets. The farmers awareness for improvement is increasing as they see good results concluded in good return of their investments. The focus on the financial processes will increase the level of control over the business and will help farmers to find financial solutions for improving the rentability. The ones which have a good financial experience know how and when to use solutions for addressing the risk, for example hedging for foreign currency or for crop prices. Also, their way of thinking is going in the directing for getting higher profits by revenues increases based on good investments or by costs reduction.

The continuous changes from the economy put under question mark the traditional concepts for business and economy. In the past, the innovation was used mainly by the big companies, but today, it is a necessity to apply it for surviving and development. Just with innovation, the companies can go ahead in the same time with the changes in all business areas, especially in technology. (Cambalikova *et al,* 2021) The dimensions analyzed and the conclusions resulted reflect the double way between financial indicators and innovation process. Farmers are more than aware about the necessity of investing in new methods of doing business: modern equipment, input technologies, people, processes. Despite this high level of awareness, they do not have a specific interest to find information about sources of inspiration. They just wait specialized suppliers to approach them.

The new innovative products and methods will continue to appear in the market as the conditions are completely different from one year to another one from all points of view: economic, social, weather, geopolitical. The farmers should increase the level of awareness about the advantage of the innovation and look continuously for adaptive solutions. Further researches should investigate more the link between risk perception and level of innovation integrated at company level.

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