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Causal Recipes Assessing the Quality Level of Incubation Programs – A Comparative Approach Italy – Romania

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ABSTRACT

Configurational comparative methods integrate qualitative and quantitative approaches, being particularly useful to provide a better understanding of entrepreneurial ecosystems from different countries. Business incubators should not be treated as independent entities, but rather integrated into the entrepreneurial ecosystem, in order to promote innovation, competitiveness, technology transfer and other key public policy objectives to support entrepreneurship. The objective of the qualitative-comparative study carried out in this article is to determine the causal recipes that influence the quality level of incubation programs in incubators in Italy and Romania. Findings from this empirical research outline how the antecedent conditions (degree of incubator involvement in the initiation stage; degree of involvement of the incubator in the start-up stage; degree of incubator involvement in the execution stage; degree of incubator involvement in the commercial development stage; financial support for incubated start-ups; business accelerator services available) lead to a high-quality level of incubation programs.

1. Introduction

The concept of "business incubator" is used to identify various programs or initiatives, promoted by private or public bodies, whose purpose is to encourage and support the development of new forms of business. In general, these structures offer strategic consulting services, physical spaces, equipment and logistics structures, training and dedicated financing. These activities have the common goal of supporting the growth and competitive consolidation of existing start-ups within them, as well as conveying an entrepreneurial vision to those preparing to launch their own economic initiative (Gerlach, and Brem, 2015).

Although the evolutionary theory of the firm argues that selection mechanisms are a necessary phenomenon and that the failure of new firms is a natural thing, there is an extensive literature that supports the existence of theoretical reasons for supporting innovative start-ups with support structures, such as business incubators (Johnsrud and Springs, 2004). According to this literature, companies in the early stages of their existence operate in a context characterized by "market failures", which would prevent them from reaching a state of social efficiency in the absence of public intervention (Knopp, 2007). Such failures could be attributed, in part, to the difficulties that start-ups would face in accessing particularly important inputs, such as financial resources (due to shortcomings in financial markets), knowledge, technology and networking that are extremely important for the success of the company (Colombo and Delmastro, 2002). On the other hand, innovative start-ups would generate positive externalities, consisting in stimulating innovation and changing technological paradigms outside the "walls" of the company, favoring the economic system as a whole. The reasons summarized would then lead to the justification of intervention through entities - through incubators to be precise - that would support developing companies and make them less vulnerable in the early stages of their existence (Bruneel et al., 2012).

The objective of this research is to outline multiple recipes of antecedent conditions that has a significant impact on the quality level of incubation programs in incubators within two target countries: Italy and Romania.

2. Theoretical background

The objectives of the incubator can be multiple: the economic development of a disadvantaged area, the creation of jobs, the creation of start-ups in innovative sectors, the promotion of entrepreneurship, the commercialization of technology, etc. (Von Zedtwitz, 2003). The range of services offered can also vary considerably: support for new entrepreneurial initiatives is usually manifested by the provision of support

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and support services for the formulation of business and business development plans, the development of the entrepreneurial team, the search for funding and access. specialized professional services; often the services mentioned above are accompanied by an offer of physical infrastructures (spaces, research laboratories, etc.) and other facilities.

In exchange for the services provided to the incubated companies (design of business model validation, management assistance, provision of basic services such as PR, HR, legal advice, inclusion in the network of contacts) the incubator obtains a share in the start-up capital (Frenkel et al., 2008). Broadly speaking, it is possible to identify two types of private incubators: Corporate Business Incubator (CBI) and Independent Business Incubator (IBI). The substantial difference is that the former are internal realities of large companies that choose this configuration to manage research and development projects, and in some cases give life to spin-offs or projects that come from corporate resources (financial, but especially know-how) and end up becoming independent entities that contribute to the diversification of corporate strategy (Caiazza, 2014). As for IBIs, they are common capital companies that provide small amounts of venture capital for start-ups seeking start-up funds, assist in their development through a wide range of services, contributing to their development. at the founding of the company until, sometimes, at the listing on the stock exchange. More often than not, their intervention ends when other types of financiers come into play. For summary purposes, an indicative list of the main types of services provided by the typical business incubator is proposed according to Knopp's analysis (Knopp, 2007): access to Angel Investors and venture capital; high speed internet access; marketing and business planning assistance; assistance in technology marketing; assistance in forming the management team; networking activities with strategic partners; intellectual property management; coaching and improving presentation techniques; accounting, financial management and legal assistance services.

From the analysis of the relevant literature, it is possible to find out that there are distinctive elements of the success of a business incubator, even if there is no single definition of the concept of successful incubator (Kakabadse et al., 2020). In general, it is possible to identify useful factors to indicate the presence or absence of performance related to an incubation program: the ability of the incubator to achieve the predefined objectives; the success of the companies incubated after the incubation program; the perception of the success of the community of interest compared to the incubator itself.

One of the authors who addressed the success of an incubation program was O'Neal (O'Neal, 2005), who addressed the issue of the factors that contribute to the development of a successful university incubator, with special reference to the topic of new companies focused on the high-tech sector. In this case, O'Neal relates the achievement of the objectives to the success of the incubator, so it is essential to understand what the incubation program proposes. In analyzing the factors that contribute to the success of an incubator, O'Neal also emphasized the importance of the reference incubator type, linking the objectives to be achieved to the incubation model. The reference to the different categories of incubators is in this case similar to those previously analyzed, for this reason we have chosen to quote this author. Depending on the type of incubator mentioned, there are actually different objectives: for example, the opportunities for incubated companies to receive funding are not the same in all incubators, but this will depend on the network that developed the incubator, the funds available. and the success of the new business at the end of the incubation program.

The positive outcome of an incubation program can also be assessed on the basis of the success of the incubated companies once their tenancy as a tenant has ended, as this implies that the incubation program has created value for the incubated companies and led them to a successful exit (Albort-Morant and Ribeiro-Soriano, 2016). The reference to the successful exits of start-up companies from incubation is widely recognized as a factor that characterizes the positive performance of the incubator itself. This parameter is actually used to define an efficient incubator both in the literature and through government policies for evaluating the performance of business incubators. For a new company, approaching the market in a competitive way and creating value are two difficult objectives to achieve, especially if there are no financial backers, partners, offices, qualified management, professionals and consultants, etc. Therefore, there is an initial lack of resources, knowledge and capital. This implies a very high vulnerability to market complexity and competitiveness for start-up companies. Business incubators also come into play to solve this problem: the success of a new business.

Aernoudt (2004), in his definition associated with a "high-performance incubator", states first and foremost the importance of generating new successful businesses. Therefore, a successful incubator should create a fairly large number of companies, generating a new entrepreneurial spirit and expanding the growth and success potential of the incubated companies. In addition, the survival rate of companies after leaving the incubation program is also important, as this implies the success of the incubation program itself.

The elements identified by Smilor (1987) as a contribution to the perception of the success of a business incubation program are: new and attractive services and facilities; affiliation with key local institutions, both public and private; a management team of experts and professionals; promising and innovative incubated start-ups; successful exit.

In order to achieve its objectives and, consequently, its success, the incubator has characteristics, i.e. internal and external variables, which affect its activity. As for the internal factors, they may consist of: the mechanisms for selecting start-ups that the incubator decides to adopt (so-called screening practices), the resources available to the incubator during the incubation programs; the choices regarding the methods and exit schedule of the incubated companies.

Internal factors have two important implications in the life of the incubator: they define the mission to which to direct the incubation activity, and based on the services they intend to provide it will become an attractive incubator or not for born companies that want to accelerate their growth.

With regard to external factors, reference is made in particular to: the relevant entrepreneurial network for the incubator, i.e. to which new companies the incubation programs are addressed. In fact, it is important for a business incubator to be market-oriented in defining its business and the services it offers, trying to adapt to the needs of the start-up companies it intends to turn to; factors that stimulate the development of entrepreneurial culture and encourage the use of means such as business incubators to reduce the likelihood of new businesses failing and to speed up time to market; funders and promoters who contribute resources to the incubator (and, consequently, to the incubated companies) which may consist of government agencies, universities, large companies, investors and consequently on the ability of BI to find resources and skills available externally.

3. Method

Configurational comparative methods bridge the gaps between qualitative and quantitative approaches, being particularly useful to provide a better understanding of entrepreneurial issues. Recent studies link configuration analysis using qualitative-comparative analysis (QCA) with complexity theory in disciplines such as management and marketing (Pappas and Woodside, 2021). The QCA methodology is appropriate for analyzing entrepreneurial ecosystems that can reach the same outcome starting from different initial conditions and following different paths.

fsQCA aims to establish logical connections between combinations of causal conditions, which in this study are associated with the performance of incubator activities in Italy and Romania. Causal combinations result in rules that summarize the sufficiency and necessity of all possible combinations that lead to a certain outcome based on specific antecedent conditions.

The research proposition is the following: Different combinations of antecedent conditions associated with the degree of incubator involvement in supporting incubated start-ups influence the quality level of incubation programs.

Figure 1 reflects both the expected outcome (high-quality level of incubation programs - CPI) and the antecedent conditions of the research proposition:

- Degree of incubator involvement in the initiation stage (INI);
- Degree of incubator involvement in the start-up stage (DEM);
- Degree of incubator involvement in the execution stage (EXE);
- Degree of incubator involvement in the commercial development stage (DEZ);
- Financial support for incubated start-ups (FIN);
- Business accelerator services available (ACC).

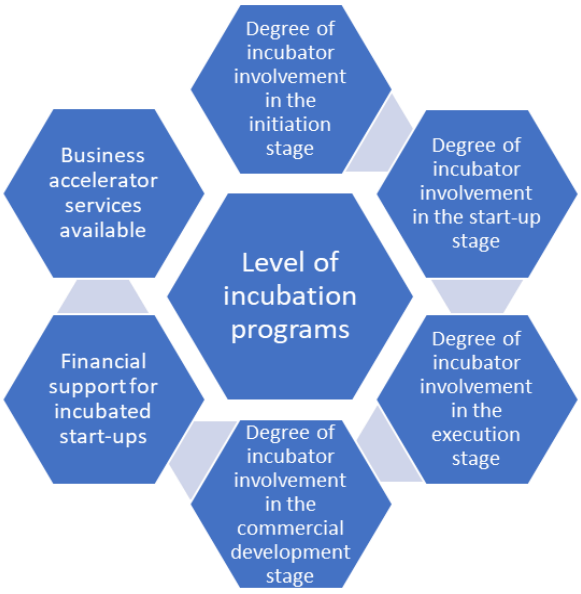

Figure 1. The framework associated to research proposition

Source: authors' contribution

The analyzes were performed separately on the Italian (74 incubators) and Romanian (55 incubators) samples.

The calibration of the previous conditions from hypothesis 2 was performed according to the following formulas:

- Compute : cINI = calibrate (INI, 5,3,1)
- Compute : cDEM = calibrate (DEM, 5,3,1)
- Compute : cEXE = calibrate (EXE, 5,3,1)
- Compute : cDEZ= calibrate (DEZ, 5,3,1)
- Compute : cFIN = calibrate (FIN, 5,3,1)
- Compute : cACC= calibrate (ACC, 5,3,1)

We generated a composite variable (cIDEDFA) that illustrates the cumulative impact of the previous six conditions on the result by applying the Fuzzyand function:

Compute : cIDEDFA = fuzzyand (cINI, cDEM, cEXE, cDEZ, cFIN, cACC).

The calibration for the antecedent conditions and the outcome are shown in Tables 1 and 2.

Table 1. Calibration of the evaluation scale for the antecedent conditions

Scale	Fuzzy value	Membership
Strongly agree	0.95	Fully in
Agree	0.82	More in than out
Neutral	0.50	Crossover point
Disagree	0.18	More out than in
Fully disagree	0.05	Fully out

Source: calibration made by fsQCA software

Table 2. Calibration of the evaluation scale for the outcome

Scale related to the item: *Of the incubated enterprises, how many (in %) ceased their activity during or at the end of the incubation period (reflects the quality level of the incubation programs - CPI)*	**Fuzzy value**	**Membership**
Less than 10%	0.90	Fully in
Between 11% and 20%	0.70	More in than out
Between 21% and 50%	0.40	More out than in
More than 51%	0.10	Fully out

Source: calibration made by authors

4. Findings

The truth table, on the Italian sample (Table 3) illustrates 8 configurations of cases, after the elimination of the lines whose consistency scores were below the critical threshold of 0.8.

Table 3. Truth table associated with testing the research proposition on the Italian sample

Edit Truth Table

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INI	DEM	EXE	DEZ	FIN	ACC	number	CPI	raw consist.	PRI consist.	SYM consist
1	1	1	1	0	1	2	1	0.980328	0.94382	0.94382
1	1	1	1	1	1	9	1	0.971096	0.943754	0.977307
1	1	0	1	1	1	6	1	0.946203	0.875912	0.96
1	1	1	0	1	1	1	1	0.94104	0.821053	0.83871
1	0	0	0	0	1	1	1	0.934673	0.717391	0.767442
1	1	1	0	0	1	2	1	0.928482	0.786516	0.823529
1	1	0	0	1	1	2	1	0.898013	0.683127	0.734513
1	1	0	0	0	1	2	1	0.892216	0.653846	0.712042

Source: fsQCA software output

The XY Plot graph (Figure 2) reflects the distribution of the 74 cases in the Italian sample, considering the placement of the cIDEDFA composite variable on the horizontal axis, and on the vertical axis the result is found (CPI). The above conditions are sufficient to achieve the result, as most cases (63 - areas A,

B, C, E, F, H, I, J, L) are placed above the diagonal in the graph, only 11 cases being framed by the triangle below the diagonal (zones D, G, K).

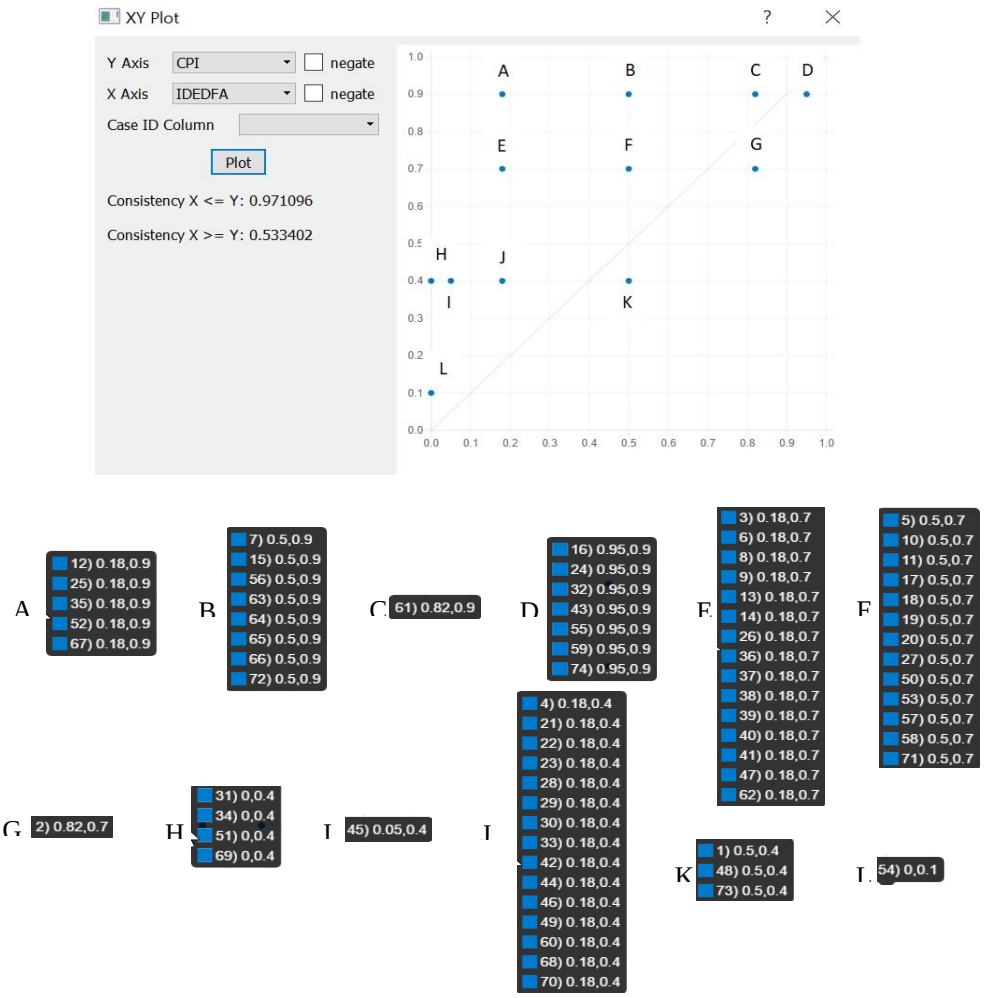


Figure 2. Distribution of 74 cases within Italian sample

Source: fsQCA software output

The algorithm for including cases in a causal prescription takes into account the proportion of cases above or below the diagonal of the XY Plot chart as a measure of consistency. The truth table design algorithm integrates both the consistency score and the cases with a strong affiliation to the causal condition or causal combination that affects the outcome. The procedure uses fuzzy member scores to assess the relevance of each case; the result is an index of consistency rather than a mere proportion of inconsistent cases.

The complex solution generated by the Quine-McCluskey algorithm highlights three combinations of antecedent conditions with a direct influence on the result, as well as the sufficiency relation in the research proposition of the configuration model, on the sample from Italy (Table 4). The model tested is:

CPI = f(cINI, cDEM, cEXE, cDEZ, cFIN, cACC)

Table 4. The complex solution offered by the Quine-McCluskey algorithm for the Italian sample

Complex solution	Raw coverage	Unique coverage	Consistency
cINI*cDEM*cEXE*cACC	**0.6952**	**0.0882**	**0.9108**
cINI*cDEM*cFIN*cACC	0.7101	0.1096	0.8770
cINI*~cEXE*~cDEZ*~cFIN*cACC	0.2564	0.0305	0.8687
Solution coverage: 0.84			
Solution consistency: 0.84			

Source: fsQCA software output

The combination with the highest consistency score (0.9108) shows that the main predictors of the outcome (high quality level of incubation programs - CPI) on the Italian sample are: the high degree of involvement of incubators in the start-up stage (INI); the high level of involvement of incubators in the start-up phase (DEM); the high level of involvement of the incubators in the execution phase (EXE) and the provision of services and as a business accelerator (ACC).

In Table 5 we presented the necessary conditions for achieving the result on the sample of incubators in Italy.

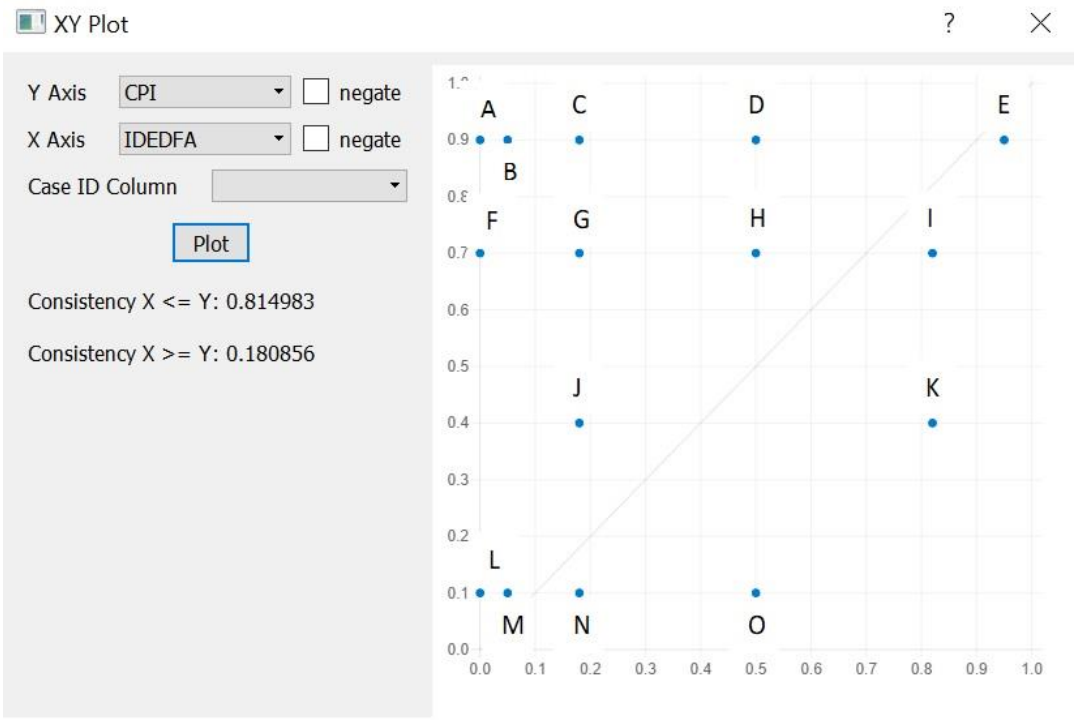
Table 5. Analysis of necessary conditions on Italian sample

Necessary conditions tested	Consistency	Coverage
cINI+cDEM+cEXE+cDEZ	0.9892	0.6933
cINI+cDEZ+cFIN+cACC	**1.0000**	**0.6657**
cDEM+cEXE+cFIN+cACC	1.0000	0.6616
cEXE+cDEZ+cINI+cFIN	0.9851	0.7130

Source: fsQCA software output

A causal combination between the high level of involvement of incubators in the start-up stage (INI), the high level of involvement of incubators in the commercial development stage (DEZ); financial support for incubated start-ups (FIN) and the provision of services as a business accelerator (ACC) is the necessary condition for achieving the result with the highest consistency score, respectively coverage score among the 4 alternatives, in the case of the research proposition, applied to the sample of incubators in Italy.

In the following we continue with the presentation of the research proposal test on the Romanian sample.



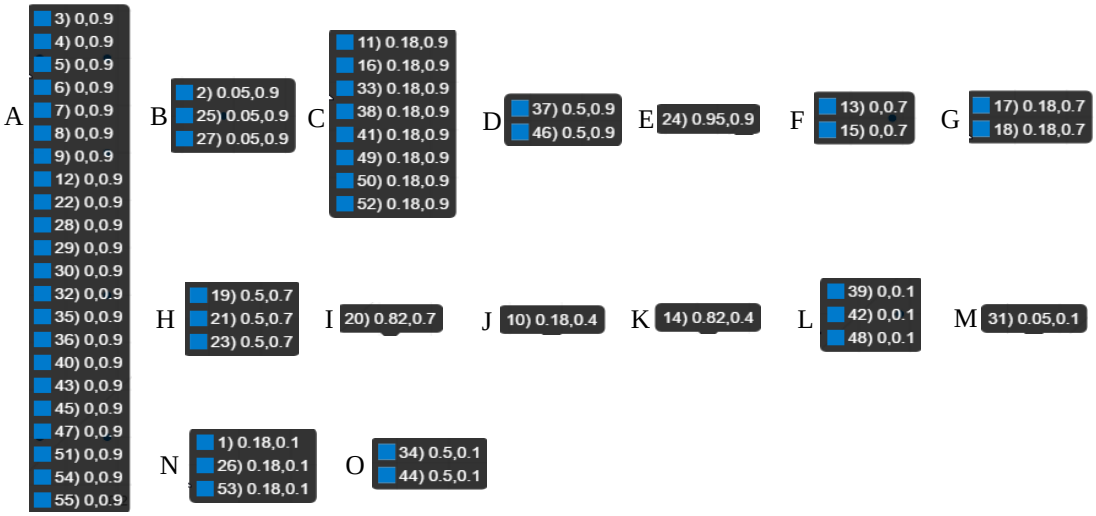


Figure 3. Distribution of the 55 cases in the Romanian sample

Source: fsQCA software output

The XY Plot graph (Figure 3) reflects the distribution of the 55 cases in the Romanian sample and demonstrates the validation of the sufficiency relationship between the previous conditions and the achievement of the result, as most cases (47 - areas A, B, C, D, F, G, H, J, L, M) are placed above the diagonal in the graph, only 8 cases being framed by the triangle below the diagonal (areas E, I, O, K, N).

The truth table associated with the research proposition, on the Romanian sample (Table 6) illustrates 9 case configurations, after the elimination of the lines whose consistency scores were below the critical threshold of 0.8 was applied.

Table 6. Truth table associated with testing the research proposition on the Romanian sample

Edit Truth Table

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INI	DEM	EXE	DEZ	FIN	ACC	number	CPI	raw consist.	PRI consist.	SYM consist
1	1	1	1	1	0	4	1	0.970448	0.960409	0.979167
1	1	1	0	1	1	1	1	0.942308	0.875	0.913043
0	0	0	0	0	1	2	1	0.939698	0.88	0.88
0	0	1	1	1	0	1	1	0.888889	0.785715	0.785715
1	1	0	0	0	1	2	1	0.857143	0.682927	0.792453
1	1	0	0	1	1	1	1	0.844523	0.685715	0.685714
0	0	0	0	0	0	4	1	0.817638	0.738197	0.754386
1	1	1	1	1	1	3	1	0.814983	0.665298	0.723214
1	1	0	1	1	1	2	0	0.72093	0.489362	0.489362

Source: fsQCA software output

The Quine-McCluskey algorithm illustrates the complex solution that highlights six combinations of antecedent conditions with direct influence on the result, as well as the sufficiency relation in the research proposition of the configuration model, on the Romanian sample (Table 7).

Table 7.
The complex solution offered by the Quine-McCluskey algorithm for the Romanian sample

Complex solution	Raw coverage	Unique coverage	Consistency
~cINI*~cDEM*~cEXE*~cDEZ*~cFIN	0.2319	0.1070	0.8631
cINI*cDEM*~cEXE*~cDEZ*cACC	0.1390	0.0186	0.7953
cINI*cDEM*cEXE*cDEZ*cFIN	**0.4378**	**0.1871**	**0.8994**
~cINI*~cDEM*cEXE*cDEZ*cFIN*~cACC	0.0967	0.0161	0.8888
cINI*cDEM*~cDEZ*cFIN*cACC	0.1581	0.0100	0.8567
cINI*cDEM*cEXE*cFIN*cACC	0.2196	0.0050	0.8074
Solution coverage: 0.63			
Solution consistency: 0.83			

Source: fsQCA software output

The combination with the highest consistency score (0.8994) shows that the main predictors of the result (high quality level of incubation programs - CPI) on the Romanian sample are: the high degree of involvement of incubators in the initiation stage (INI); the high level of involvement of incubators in the start-up phase (DEM); the high level of involvement of the incubators in the implementation phase (EXE), the high level of involvement of the incubators in the commercial development phase (DEZ) and the financial support provided to the incubated start-ups (FIN);

We note that in the Romanian sample it is not found as a predictor for the result and the provision of services and as a business accelerator (ACC), as in the case of the Italian sample.

In Table 8 we presented the necessary conditions for achieving the result on the sample of incubators in Romania.

Table 8. Analysis of necessary conditions on Romanian sample

Antecedent conditions tested	Consistency	Coverage
cINI+cDEM+cEXE+cDEZ	0.8584	0.7779
cDEM+cEXE+cFIN+cACC	**0.9027**	**0.7518**
cINI+cDEZ+cFIN+cACC	0.8997	0.7545
cEXE+cDEZ+cDEM+cFIN	0.8513	0.7864

Sursa: fsQCA software output

A causal combination between the high degree of involvement of incubators in the start-up stage (DEM), the high degree of involvement of the incubators in the execution stage (EXE); financial support for incubated start-ups (FIN) and the provision of services as a business accelerator (ACC) is the necessary condition for achieving the result with the highest consistency score, respectively coverage score among the 4 alternatives, applied on sample of incubators from Italy.

We note that the Romanian sample does not include in the relation of necessity, compared to the Italian sample, the antecedent conditions: the high degree of involvement of the incubators in the initiation stage (INI), the high degree of involvement of the incubators in the commercial development stage (DEZ).

5. Conclusions

The results obtained illustrate the differences between the perceptions of the representatives of the business incubators in the two countries regarding the most influential predictors of the performance of the incubation activities in these countries.

The business incubator-specific management processes aim at a wide range of business development services, full access to incubation spaces in flexible conditions, in order to meet the needs of innovative start-ups. The business package offered by a business incubator is designed to increase the success and growth rate of new businesses; therefore, it maximizes their impact on economic development. Studies on the factors that influence the performance of business incubators and accelerators from a comparative perspective, such as those presented in this doctoral thesis, are considered extremely valuable as decision makers in one country can take valuable ideas from the managerial practices of incubators / accelerators in others. countries.

The Romanian entrepreneurial ecosystem, noted globally for its recent dynamics, must recover in a short time the gaps compared to the ecosystems of European countries with a higher level of development and a stronger entrepreneurial culture.

The originality of the approach lies in the conceptual approach of comparative research of business incubators and accelerators in the two countries through the genetics of start-ups and their positioning at a specific stage of their life cycle, the analysis of the needs of these entrepreneurial support tools of the genetic map specific to each start-up.

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