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# The Influence of Local Economic Conditions on Start-Ups and Local Open Innovation System

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**Abstract:** The development of start-ups is a driving force of the local and regional economy. Therefore, it should be in the interest of municipal authorities to take actions for their organizational and resource support. In the conditions of limited public resources, however, it is a difficult and multifaceted task. Therefore, in this article, the authors attempt to determine the influence of local conditions on the establishment of start-ups. As a natural environment for the development of this type of entrepreneurship, cities were considered in which accessibility to infrastructure and human resources is high, and thus, by definition, conducive to creativity and innovation. Such a formulations of the objective and scope of the research allowed the existing theoretical and research gaps to be filled, relating to the identification and establishment of a hierarchy of local determinants of creating start-ups in the urban environment. The research in question was carried out on a representative sample of 287 Polish cities using questionnaire techniques and structural modelling. The results confirm the dominant influence of human and financial capital on the establishment of start-ups. The research also shows a slightly less significant influence of business incubators and technology parks on the creation of start-ups, which implies the need to improve the performance of these entities. The results also point to the positive role of direct city involvement in the development of this form of entrepreneurship.



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**Keywords:** start-ups; city; urban economics and management; innovation and entrepreneurship in the city

## 1. Introduction

Start-ups are the strongest manifestation of entrepreneurship and innovation [1]. They are distinguished from other business ventures by dynamic market expansion executed most often using modern technologies, such as information and communication [2–5]. Their rapid development is guaranteed by unique know-how and investor financial support (business angels; venture capital). Due to exceptional originality of business ideas, high demand for capital, and intensive pace of developments, start-ups are high-risk ventures, intended for visionaries and entrepreneurs with above-average level of risk acceptance.

From an economic point of view, start-ups are very valuable sources of innovation and civilizational, as well as social development. Their creation and development mean that a classic growth of local entrepreneurship exists, as well as contributing to broader promotion and increase in recognition of the region. They also become the basis for a more dynamic local development by attracting new sectoral investors and creating new jobs. In a long-term perspective, well-functioning start-ups contribute to the increase in income levels of the local community and improve the quality of life in the region [6–8]. Previous research also suggests that the initiation and development of start-ups—in addition to strengthening entrepreneurship—contributes to increased resilience to external threats, including those related to pandemics [9].

Considering the benefits associated with the development of start-ups, this article attempts to determine the impact of local conditions on the formation of start-ups. A

natural environment for the development of this type of entrepreneurship was considered, cities in which accessibility to infrastructure and human resources were found to be high, and thus, by definition, conducive to creativity and innovation [10]. The relevance of this choice is confirmed by the results of empirical studies to date. According to many researchers, cities stimulate innovation by fostering new combinations and recombination of talented and creative people. There is a research-supported relationships between the creation of unusual, unique innovations and population density. The larger it is, the greater the number of unique patented inventions, which result from the accumulation of competences and skills, and the possibility of their exchange within the extensive and dense network of interpersonal connections, found in highly urbanized areas [11]. Cities are, thus, a natural and favorable environment both for the emergence of start-ups and for the creation of open innovation by and through them. This claim is confirmed by Dvir and Pasher (2004) [12] where they describe cities as urban innovation engines. The authors also highlight the role of the city as a center of intensive flows and exchange of knowledge between its inhabitants and additional stakeholders, which confirms the role of this entity in creating open innovation. E. Glaeser (2012) [13]—a renowned urban economist—declares that cities are in fact the healthiest, greenest and culturally and economically richest places to live. He makes an extensive argument about the importance and splendor of the city, claiming that the city is the greatest work of mankind and a guarantor of a better future for future generations.

Cities themselves, in practice, are increasingly integrating entrepreneurship issues into their strategies and actively engaging in the creation of open innovation through talent attraction, start-up development programs and open data initiatives that reflect the gradual adoption of a platform logic of collaboration in urban economic development [14,15]. In addition, the research suggests that if strengthening open innovation by SMEs or start-ups is developed in a city or government strategy, it will provide a source for the development of knowledge-based urbanization and further economic growth of the city, as well as the resources involved in the innovation creation process [16,17]. Therefore, the activities undertaken by cities can provide valuable support in the process of innovation transfer and diffusion.

The development of cities, and the various forms of entrepreneurship and innovation that arise in those cities, is particularly important in emerging economies as it allows them to increase the dynamics of economic growth [18]. Companies also become the beneficiaries of an improved financial situation of such economies, as they are then able to acquire new knowledge, which improves their profitability and efficiency [19]. Economic growth combined with technological innovation significantly increases the productivity of economic enterprises and the welfare of residents. At the same time, local and government policies, implemented through business capital support and human resource capacity strengthening, have a positive impact on the development of small- and medium-sized enterprises, including startups [20].

For the above reasons, the research was conducted in Poland, a developing economy, and thus, at the establishment of entrepreneurship and innovation as the driving force of economic growth and development. The main objective of the research was to determine the actual strength of the conditions developed by city authorities on the creation and development of start-ups. The results of empirical research confronted the activities of Polish city authorities for the development of this form of entrepreneurship with theoretical recommendations, which became the basis for defining improvement recommendations for city management.

In a broader aspect, the research carried out by the authors provides knowledge on the direction and strength of the influence of city authorities on the creation and development of start-ups in developing economies. They also fill the existing theoretical and research gap relating to the identification of local determinants of start-ups creation in urban environment. The model developed in the article is universal and can be used for comparative analysis in other economies. It can also be treated as a starting point for

shaping the desired effects of activities to strengthen innovation and creativity, whose real manifestation is the existence and development of start-ups.

## 2. Literature Studies

### 2.1. Innovativeness As a Distinguishing Feature of Start-Ups

The concept of innovation was concretized by J. Schumpeter, who defined it in terms of the occurrence of one of the following situations:

- (1) introducing a new product that customers have not yet used or giving new features to an existing product,
- (2) implementation of a new production method not previously used by the relevant industry,
- (3) opening up a new market where the industry has not previously operated,
- (4) acquiring new sources of production raw materials,
- (5) introduction of a new organizational structure in a given industry [21].

The *Oslo Manual* summarizes the above possibilities in a statement that innovation is the implementation of a new or significantly improved product (manufactured item, service) or process, a new organizational method or a new marketing method in economic practice, workplace organization or relations with the environment [22]. The minimum requirement for an innovation to occur is therefore only that the product, process, organizational or marketing method is new or significantly improved for the company [23].

Related to innovation is the notion of an innovative enterprise, i.e., one that has introduced at least one product, process, organizational or marketing innovation to the market in the short term (up to three years) [22]. The very ability to innovate is referred to as innovativeness. The stronger it is, the more innovative the company becomes. Among the most important characteristics of an innovative enterprise is the possession of the ability to acquire, collect, use and develop knowledge in innovation processes.

This knowledge can be obtained inside the organization by using its own resources. It can also be the result of a compilation of its own capabilities and the experiences of other market players. This view of the genesis of innovation allows it to be divided into closed and open innovations. The open nature of innovation fosters widespread knowledge transfer and diffusion, which in turn, enhances macro-level innovation and supports dynamic economic development [24,25]. Knowledge sharing can benefit manufacturing and new product development companies in improving the quality of their products and increasing business potential [26]. The use of open innovation also reduces resource use, multiplies the results of collaborative ideas and activities, and strengthens economic relationships [27,28]. Networking of innovations may therefore become a source of synergy effects both, for the cooperating entities and for the local and regional economy.

Start-ups are distinguished from other businesses by the high level of innovation that accompanies their existence from the moment the business concept is developed. They offer an innovative product or service that often responds to very unique, not always realized, customer needs. This allows start-ups to grow faster than other companies and to dynamically explore new markets [29]. Very often, in the process of market expansion, they also use innovative business models [30–32] and make extensive use of the Internet, treating it as the best way to attract modern buyers interested in an innovative concept. As a result, the activity of start-ups is concentrated in modern technology sectors, such as IT, telecommunications or fintech [33].

Taking into account the specificity of start-ups, it can be concluded that the sectors in which they operate and the rapid dissemination of the effects of their activity through the use of Internet communication predispose them to exert a positive influence on the emergence of open innovation, available to a wide range of users and followers. Many of them are also created by taking advantage of open innovation, which in its development phase, inspires and fuels the dynamic growth of this type of enterprise, originally equipped with a rather modest resource potential and experience package. According to Chesbrough et al. (2006; 2002) [34,35], it was the development of information and communication technolo-

gies, and their diffusion that became the main rationale for moving from a closed to an open understanding of innovation, in which the boundaries between the company and its environment become blurred. In this system, cities and the institutions, created with their participation, become natural external partners in the model of open innovation according to the concept of successive economic helices [36].

Therefore, cities that are the setting for this reflection and research should be interested in the emergence and development of start-ups, as they are not only a source of support for local entrepreneurship, but also contribute to strengthening open innovation that fosters intensive economic and social growth [37–39]. They can also play a coordinating role in the process of knowledge transfer and diffusion between urban stakeholders.

## 2.2. Determinants of Existence and Development of Start-Ups

Previous research and considerations show that, in the development of start-ups, the dominant role is played by resource conditions, which are the foundation of their functioning [40,41]. These conditions concern primarily human resources, both of a strategic and operational nature [42]. The initiators of start-ups are people endowed with above-average creativity, open to new challenges, accepting high risk accompanying innovative activities [43]. Success of the whole venture depends on their ingenuity and determination.

Start-up leaders are obviously distinguished by an above-average level of entrepreneurship, and what distinguishes them from other people, and other entrepreneurs is dynamism of actions and willingness to take risks. The factors they see in the environment and its changes are mainly opportunities for the realization of their dreams and plans. They are optimistic about challenges and adapt to changing market conditions without much difficulty [44,45]. The individual level of entrepreneurship is thus one of the key determinants of creating start-ups immutably connected with their initiators (originators; leaders; strategic human potential).

In addition to talented leaders (managers), start-ups must also employ qualified operational staff on whom the quality of execution of innovative products and/or provision of such services depends [46,47]. Given the industries in which start-ups develop, these must be employees with knowledge of modern technologies, especially IT and ICT [48]. Recruiting them and getting them to work in a high-risk environment is not an easy task. Nevertheless, the implementation phase of start-ups depends on their involvement, knowledge, and experience.

Notably, both the use of modern technologies and creating product or service innovations with their use and acquiring qualified specialists from the labor market require involvement of considerable capital resources, both at the concept and execution phases. Therefore, one of the biggest obstacles in launching start-ups are financial barriers [49–51]. Access to external financing for start-ups in the form of the most popular bank loans is difficult due to the parallel occurrence of the following circumstances:

- high capital intensity;
- unique product/service and business model;
- lack of history of the company operation;
- lack of collateral for the loan;
- high risk of bankruptcy.

Due to the above circumstances, the most common form of financing start-ups are business angels and venture capital [52–57]. However, such forms of financing are lined to the necessity of accepting a significant role of investors in the process of establishing and developing a given enterprise. The cost of raising such capital is also much higher than the average interest rate on bank loans. In exchange for accepting high risk, investors usually, expect a few dozen percent shares in the profits of start-ups [58–68].

The consequences of financial dependence on investors is very often the loss of control over the implementation of strategic and even operational activities. In the development and maturity phase, start-ups are regularly taken over by investors and transformed into profitable enterprises under private investor ownership, with little or no involvement

from the original originators. Such actions can stifle entrepreneurship and innovation, and discourage start-up initiatives. International statistics show that many innovative ventures (often also those supported by public funds) become the only an attractive form of increasing investors' capital without engaging their own human resources and the intellectual capital they represent [69–72]. Importantly, the organizational separation of the start-up additionally limits the risk of investors in case of the collapse of the start-up. They do not bear the economic, image, organizational, and legal consequences of the failure of a business. They only lose the invested capital, which usually does not significantly deplete their accumulated financial resources [73–76].

### 2.3. *The Role of City Authorities in the Development of Local Entrepreneurship*

New enterprises, including start-ups, are most often established in cities or in their immediate vicinity. This is associated both with access to technical and social infrastructure, and proximity to potential markets. Thus, the city is an environment conducive to the development of entrepreneurship [77–81]. Nevertheless, the mere existence of a city does not guarantee the emergence of start-ups. Their final number and scope of activity are determined by two groups of conditions of urban life.

The first is related to the general economic, technological, and civilization conditions of the city. The better they are and the better quality of life they provide to inhabitants, the more favorable they are for entrepreneurial activities and the creation of start-ups. This is confirmed by data and observations of the best developing cities in the world, often referred to as Smart Cities, which are characterized by above-average well-being of the urban community associated with access to state-of-the-art IT and ICT technologies and high levels of residents' income, health care, and education [82,83]. These cities attract new investments and create conditions conducive to the use of creativity and innovation [84,85]. In this way, they become incubators for new business ventures, including those emerging as start-ups.

Therefore, the city can decide on the development of entrepreneurship indirectly by creating the most favorable conditions for the establishment of business and life of residents. It can also take action to directly strengthen economic initiatives by providing organizational and financial support [86,87]. Operations in this area form the second group of determinants of urban life and entrepreneurship development.

Typical forms of organizational support include the creation of business incubators and technology parks in the city. Technology parks ensure the flow of knowledge and new technology between science and business. Their role is to strengthen innovation and creativity through the dispersion of the latest discoveries and scientific achievements, which are the starting point for their practical use in the economy and further improvement [88–92]. The operations of technology parks can, thus, be used in the conceptual phase of start-ups when unique ideas and concepts are born. The research to date shows that organizational support from municipal authorities for entrepreneurship has positive economic and social effects. The activities of the city as a promoter and coordinator of innovation can also foster large-scale transfer and diffusion of knowledge, which initiates open innovation that can multiply the benefits of cooperation on the city—science—business line [93]. Nevertheless, it should be noted that the city's activities in supporting entrepreneurship and innovation should result from leadership that takes into account the opinions of local communities, and not only the leaders of municipal authorities. Otherwise, they may not have the desired effect [94].

Business incubators, on the other hand, are designed to strengthen entrepreneurship in the implementation phase. This is because their main goal is to assist in setting up a business, which most often takes the form of legal, organizational, and financial services and advice [95]. This allows start-ups to save time and resources, and minimize the risk of functioning in the establishment phase.

City authorities can also support entrepreneurship financially. The support can either be a direct aid provided as part of city budgets (grants, subsidies or/and exemptions from



local taxes and charges), or indirect aid involving searching and informing regarding the available external funds and administrative assistance, while obtaining them. Due to the limitation of public funding, the latter is encountered much more often.

However, it is worth noting that an effective form of financing start-up initiatives can be a public-private partnership, which increase the power of the city to influence the final direction and form of the entrepreneurship developed [96,97]. The literature suggests that this is also an important and useful source of funding for open innovations [98]. Nevertheless, it is not used everywhere because of the legal and organizational complications with which it is associated.

The promotion of start-up initiatives is also an important element of the city's activities for entrepreneurship. It has three functions: Informing, encouraging, and educational. The city, through its available media channels, can disseminate knowledge about emerging and existing start-ups by advertising their activity and initiative. This, in turn, can be an incentive for potential start-up initiators to make their business intentions more realistic. The transfer of knowledge and information on what a start-up is, how it works, and what economic and social benefits it brings, also plays an important educational role, essential for creating the next generation of visionaries-entrepreneurs.

The activities of the municipal authorities in favor of entrepreneurship described above are in line with the concept of successive economic helices (triple, quadruple, quintuple), in which the city, as a partner of business, has been present from the very beginning. In the triple helix, partners for economic development, include: Business and city and science, which are successively joined by the local community and environmental organizations. Such an arrangement of cooperation should guarantee the realization of the goals of all the mentioned stakeholders, and ensure sustainable and dynamic economic growth at the local and regional level.

In Poland, municipal authorities in the policy of supporting entrepreneurship and start-ups use mainly organizational and administrative instruments, which are part of local and regional development strategies. Many cities are also setting up entrepreneurship development programs, including support for start-ups. Financial support is provided relatively infrequently due to the inadequacy of public funds and the sub-optimal economic situation of most units facing basic housing and communal infrastructure problems. It most often takes the form of mediation, assistance in obtaining external funds, for example EU funds. Public funds are also used to finance institutional forms of entrepreneurship support in the form of incubators, accelerators and technology parks, which on the one hand, encourages open innovation and the establishment of start-ups. On the other hand, it may not be an effective enough aid method due to the empirically confirmed avoidance by these institutions of spending public funds [99] and reluctance to initiatives in the field of public-legal partnership.

### 3. Materials and Methods

The reference study conducted allows us to conclude that the literature on the determinants of the creation of start-ups is quite extensive and mainly concerns: (1) Intellectual capital necessary for their creation, (2) the impact of start-ups on innovation, and (3) the sources of financing for this type of entrepreneurship. Much attention is also given to the role of business incubators and technology parks in the development of start-ups. However, the relationship of local urban policies and their impact on the existence of start-ups is undertaken much less frequently. Meanwhile, the activities of the city can significantly support the development of this form of entrepreneurship through material and organizational aid, leveling economic risk, and promotion. The involvement of municipal authorities in favor of start-ups—in line with the concept of economic helices—may make their development more balanced, i.e., adapted to the needs of the urban environment and all stakeholders. In view of the above circumstances, the main objective of the research, presented in the following part, was to determine the actual strength of the influence of con-

ditions created by city authorities on the creation and development of start-ups. Within the framework of this objective, the authors tried to answer the following research questions:

1. What is the direction and strength of the influence of individual urban determinants (directly or indirectly created by the city) on the development of start-ups?
2. What is the hierarchy of determinants of start-ups development in cities?
3. Do municipal authorities in Poland, which is a developing economy, have a positive influence on local entrepreneurship implemented in the form of start-ups?
4. How can cities use the experience and the identified interdependencies to develop start-ups in the future?

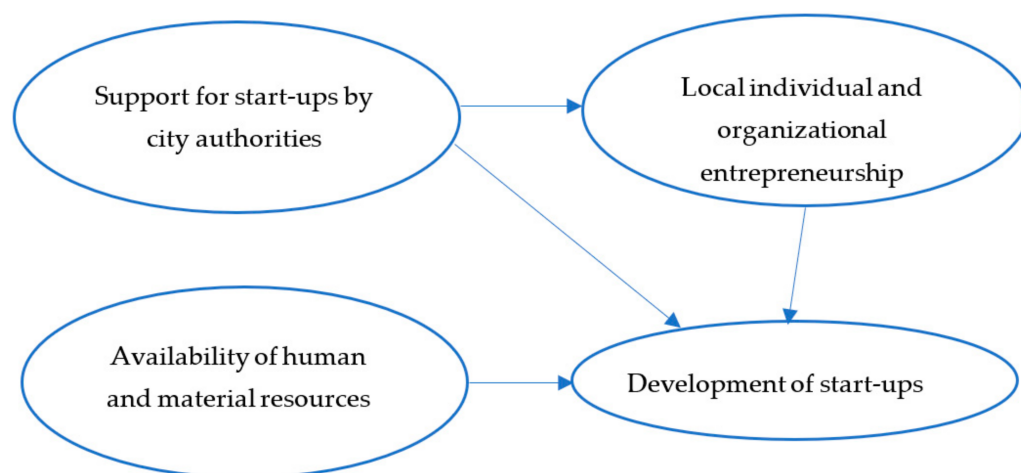
The research on the influence of urban conditions on the existence of start-ups was conducted in 287 out of 930 Polish cities. It was a representative sample assuming a 95% confidence level, a fraction of 0.5 and a maximum error of 5%. Due to the representative and random selection of the sample, the results of the research could be generalized to the whole population.

The representatives of the city authorities, directly responsible for developing development strategies, including plans to support urban entrepreneurship, participated in the survey. This was a technically commissioned survey carried out by a reputable entity specializing in surveys of public administration units, which addressed the heads of the strategy and city development departments. The questionnaires were therefore completed by people with knowledge and competence of the research area in question.

The research covered Poland, due to the necessity, raised in the introduction, of conducting research on entrepreneurship in emerging economies, and the need to formulate practical recommendations for city authorities in the area of activities, aimed at enhancing the creativity and innovativeness of residents. These are key conditions for economic development and improving quality of life in the city. The choice of this national case study was also determined by the availability of the research sample to the authors. The choice of the case study as one of the research methods enabled an in-depth, contextual analysis of the research findings. According to the recommendations of R. Yin [100], the use of the case study method is recommended to find answers to questions of an exploratory nature, i.e., concerning “how” and “why” a phenomenon occurs. The case study is an attractive method for solving problems in institutional economics, strategy, strategic management and decision-making, and was used as part of this research. Nevertheless, it is not a method without drawbacks. The most important of these is undoubtedly that the conclusions cannot be generalized and are in a sense only a fragment of the phenomenon under study [101]. It must be added that in relation to the research presented here, the case study refers only to the choice of country for the study. However, the surveyed sample is representative and includes 287 entities. Generalization at the country level is therefore justified and the results may inspire comparative and repeated analyses, conducted in economies, other than the Polish one.

In the analysis of the relationships between the variables studied, structural equation modeling was used, which allows for a precise multivariate analysis of the empirical data and the relationships that exist between them. The structural model adopted in the analysis is shown in Figure 1. It takes into account the determinants extracted and described in the previous chapter that affect the creation and development of start-ups in the city, which are:

- availability of human and material resources;
- local individual and organizational entrepreneurship (technology parks and business incubators);
- support of the city authorities.



**Figure 1.** Structure of a research model for the determinants of start-up development. Source: own work.

The determinants listed above were included in the model as endogenous latent variables. The exogenous latent variable was the development of start-ups assessed by their number.

Human and financial resource potential was defined by three explicit variables, including the availability of qualified personnel, general financial support for innovative activities, and the ability to obtain venture capital (a typical source of funding for start-ups). As highlighted in the literature section, the resource responsible for creativity and innovation is people. In the case of start-ups, both founders and employees must have a lot of knowledge and experience in the field of modern technology, and the availability of specialists has been identified as one of the key determinants of start-ups. It is worth adding here that the city has the possibility of indirectly influencing the quantity and quality of human resources by shaping favorable housing and employment conditions. Financial resources also play an important role in the creation of start-ups, which is why the following two factors were included in the economic resource determinants: (1) availability of a typical source of supply for start-ups such as venture capital and (2) financial support organized by the city.

Local individual and organizational entrepreneurship were assessed in terms of: the level of entrepreneurship among residents and the existence of business incubators and technology parks in the city. Entrepreneurship is the impulse that triggers the desire to run one's own business. Due to the fact that start-ups are characterized by a high level of risk, it can be assumed that entrepreneurs with an above-average level of acceptance of threats, exceptionally eager for new challenges, are inclined to set them up. Therefore, individual entrepreneurship as a characteristic of the selected residents was included in the model analysis. In addition, organizational entrepreneurship as an expression of the city's support for entrepreneurial activities, taking the form of business incubators and technology parks, which in light of the research results cited earlier, play an important role in the development of urban entrepreneurship, was also included within this latent variable.

To measure city government support, 2 explicit variables were used regarding a city government's involvement in the creation of start-ups and the promotion of this form of entrepreneurship implemented in the city's participation. As start-ups are a relatively young form of entrepreneurship, not all municipalities are aware of their importance in the urban economy, and thus, not all cities see the need to become involved in their creation and operation. Meanwhile, the research to date suggests that city authorities can significantly support knowledge transfer and diffusion, thus, contributing to increasing innovation, including co-creation of open innovation. The final number and effects of activities, carried out in the form of start-ups, will thus, depend on the degree of their involvement, including



the promotion of this form of entrepreneurship. With this in mind, both variables indicated were included in the structural model.

A synthetic list of latent and explicit variables used in the designed model is presented in Table 1. Therefore, the total structural model included 9 explicit variables. The explicit variables in the survey took the form of questions evaluated on a five-point Likert scale indicating the assessment of a given factor, where 1 meant very poor, 2—poor, 3—average, 4—good and 5—very good.

**Table 1.** List of implicit and explicit variables used in the research model.

Implicit Variables (Model Dimensions)	Explicit Variables (Survey Questions)
Development of start-ups	Number of start-ups emerging in the city
Availability of human and financial resources	Availability of qualified personnel in the city
	Support of entrepreneurs in raising funds for innovation
	Availability of venture capitals funds
Local individual and organizational entrepreneurship	Level of entrepreneurship of the city's residents
	Level of functioning of entrepreneurship incubators in the city
	Level of functioning of technological parks in the city
Support for start-ups by city authorities	Involvement of city authorities in the development of start-ups
	Promotion of start-up initiatives by the city authorities

The goodness of fit of the model was assessed using:

- Steiger-Lind's RMSEA;
- GFI (goodness of fit index);
- AGFI (adjusted goodness of fit index).

Also, in the process of building the model, the guidance of R. Schumacker and R. Lomax was followed, where:

1. its construction included the existing and presented theory,
2. sequential approach was used for estimation of measurement and structural model parameters,
3. relationships between implicit variables were verified and tested to check the effectiveness and functionality of existing relationships.

The development of the structural model for the dimensions presented above was preceded by their statistical analysis, allowing us to become familiar with the structure of the responses to the various survey questions.

## 4. Results

### 4.1. Statistical Analysis of Model Dimensions

The research process began with statistical analysis of the survey question response data. Table 2 presents descriptive statistics for individual survey questions that determine the identified dimensions of the model. Table 3 presents the distribution of answers to questions in the survey addressed to Polish cities.

Data presented in both tables show that, among conditions for establishing start-ups, the respondents assessed the availability of venture capital funds as the worst. In about 12% of Polish cities, the possibilities of obtaining such a source of financing were assessed as good or very good. This situation may pose a serious barrier in the development of this form of entrepreneurship, as the previous research and considerations clearly show that it is one of the key determinants of the existence of start-ups.

**Table 2.** Descriptive statistics for individual survey questions.

Question	Average	Median	Deviation	Variation Coefficient	Skewness	Kurtosis
<b>Development of start-ups</b>						
Number of start-ups emerging in the city	2.662	3.000	0.986	37.05%	0.059	−0.336
<b>Availability of human and material resources</b>						
Availability of qualified personnel in the city	2.955	3.000	0.983	33.27%	−0.265	−0.476
Support of entrepreneurs in raising funds for innovation	2.902	3.000	0.937	32.29%	−0.035	−0.106
Availability of venture capitals funds	2.328	2.000	0.977	41.99%	0.3675	−0.460
<b>Local individual and organizational entrepreneurship</b>						
Level of entrepreneurship of the city's residents	3.446	3.000	0.795	23.08%	0.031	−0.223
Level of functioning of entrepreneurship incubators in the city	2.697	3.000	1.244	46.12%	0.142	−0.975
Level of functioning of technological parks in the city	2.459	2.000	1.228	49.92%	0.481	−0.780
<b>Support for start-ups by city authorities</b>						
Involvement of city authorities in the development of start-ups	3.160	3.000	0.991	31.34%	−0.174	−0.186
Promotion of start-up initiatives by the city authorities	2.993	3.000	1.068	35.67%	−0.090	−0.489

**Table 3.** Survey response structure [%].

Question	1-Very Poor	2-Poor	3-Average	4-Good	5-Very Good
Number of start-ups emerging in the city	13.58	27.18	41.81	14.29	3.14
Availability of qualified personnel in the city	8.71	21.25	39.03	27.87	3.14
Support of entrepreneurs in raising funds for innovation	7.32	23.01	45.99	19.51	4.18
Availability of venture capitals funds	21.61	37.63	28.56	10.80	1.39
Level of entrepreneurship of the city's residents	0.35	9.41	44.25	37.28	8.71
Level of functioning of entrepreneurship incubators in the city	21.60	24.75	23.34	23.00	7.31
Level of functioning of technological parks in the city	26.48	30.31	20.91	15.33	6.97
Involvement of city authorities in the development of start-ups	5.92	16.03	42.51	27.18	8.36
Promotion of start-up initiatives by the city authorities	9.76	20.21	38.68	23.69	7.66

The creation of start-ups in Poland was also not favored by the level of development of entrepreneurship organized in the form of business incubators and technology parks. After the availability of venture capital, these were the two next worst rated determinants. Only 22% of respondents rated the level of functioning of technology parks as good or very good. For business incubators, the percentage of such ratings was slightly higher—over 30%, but the average score for this determinant was below 2.7.

The availability of qualified human resources and the level of financial support for entrepreneurs were also rated below average by the representatives of Polish cities, which combined with unfavorable conditions in the area of venture capital and organized entrepreneurship, provides grounds for a negative assessment of development perspectives of start-ups in Poland.

As a rule, the only conditions favoring the creation of this form of entrepreneurship—rated above 3.0—were the individual level of entrepreneurship of inhabitants and the involvement of city authorities in the creation of start-ups. Only in about 10% of the surveyed cities, the level of entrepreneurship of inhabitants was assessed as poor or very poor, which indicates that the local community is active, undertakes entrepreneurial activities, but is limited by resource conditions.

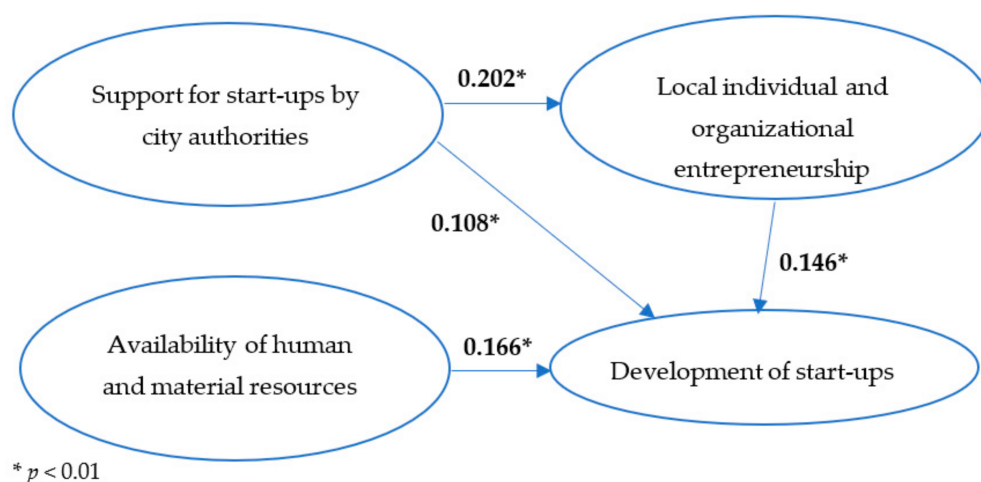
Interestingly, despite the declarative support for start-ups, the promotion of this form of activity by the city authorities was also rated below average. Therefore, the overall self-assessment of the municipal authorities, in terms of support for start-ups was above average, but not necessarily documented by practical activities in this case, achievable without engaging additional and substantial human or financial resources.

As a result of the identified conditions, the number of start-ups in Polish cities was estimated at 2.662, which proves their very poor development, supported mainly by individual entrepreneurial activities of their inhabitants.

It is also worth noting the high diversity of scores for the key determinants of the development of start-ups, exceeding 40% and documenting the imbalance of local and regional economic conditions in Poland.

#### 4.2. Estimation of Parameters and Goodness of Fit of The Structural Model

The data obtained in the survey, and described in the previous subsection, are not normally distributed, so in the structural modelling process, the Asymptotically Distribution-Free (ADF) method was used. As a result of path searching for a model that best describes the influence of Polish cities on the creation and development of start-ups, the model presented in Figure 2 was obtained, which corresponds to the theoretical model presented in the methods section.



**Figure 2.** A structural model describing the determinants of start-up development. Source: own work.

The indices evaluating the goodness of fit of the model are:

- Steiger-Lind's RMSEA = 0.194
- GFI (goodness of fit index) = 0.697
- AGFI (adjusted goodness of fit index) = 0.433

The above values allow us to conclude that the fit of the model to the empirical data is satisfactory. The GFI and AGFI indices are close to the cut-off values of 0.9. The RMSEA index for model non-centrality is a slightly worse model fit. Nevertheless, this model has the best fit to the data among those tested, and the influence of all variables included in the model is statistically significant at the  $p < 0.01$  level (Table 4).

**Table 4.** Structural model parameters.

Parameter	Parameter Assessment	Standard Error	T Statistics	Probability Level
Availability of human and material resources	0.166	0.036	4.653	0.000
Local individual and organizational entrepreneurship	0.146	0.037	3.973	0.000
Support for start-ups by city authorities	0.108	0.042	2.576	0.009

The obtained model parameters confirm the positive influence of all three groups of urban determinants on the development of start-ups in Poland. At the same time, the availability of resources and entrepreneurship is characterized by a stronger impact than in the case of city authorities' support.

The data obtained shows that access to human and financial resources is the most important for the creation of start-ups in Polish cities. Therefore, qualified staff, the possibility of obtaining venture capital funding or the city's financial support for innovation play a decisive role in the creation of start-ups. In this context, the city's task is primarily to shape the conditions of urban life, in such a way as to favor the supply of modern technology professionals. Education and training with particular emphasis on modern technologies used in start-ups will certainly be helpful in this respect. The attractiveness of living conditions of the city preventing the outflow of educated intellectual capital will also be an important factor. In Poland, this process is currently hindered by low wage levels, which does not encourage people to stay in the country and causes, many highly skilled professionals, to decide to work abroad.

As for access to financial resources, access to venture capital and hybrid financing with city participation is a factor that promotes the creation of start-ups. The latter was and is difficult to implement in practice due to the limited public resources and now additionally by the economic crisis caused by the Covid-19 pandemic. Nevertheless, cities can create favorable conditions for the development of entrepreneurship also through formal support, in seeking external sources and implementing incentives for potential investors. In Poland, these incentives most often take the form of tax reliefs and exemptions or opportunities to operate in special economic zones.

When comparing the model results, described above, to the answers of the respondents, we should add that the identified model dependencies do not augur well for the dynamic development of start-ups. Most Polish cities cannot offer to potential entrepreneurs either venture capital, financial support for innovation, or qualified human resources. Favorable conditions in this respect are characteristic only for big cities with good financial standing, which limits the development opportunities of this form of entrepreneurship and may additionally contribute to the deepening of differences among Polish cities.

The coefficients of the model also showed that individual and local entrepreneurship (entrepreneurship level of inhabitants; technology parks; business incubators) is slightly less important for the development of start-ups. Although it has a positive impact on the

number of start-ups in each city, its influence in terms of model parameter value is lower than the influence of resource determinants. As a result, it turns out that municipal support for start-ups, realized through business incubators and technology parks (in the model the relations of those variables are significantly correlated as 0.202), does not bring good results as one could expect, both in the context of the goal of establishing those entities and the cities' involvement in their creation. This reflects a certain weakness and ineffectiveness of these institutions, which as part of the core of their activity are supposed to stimulate and develop local and regional entrepreneurship. It is also an important signal for Polish cities to analyze the activity of business incubators and technology parks, in terms of effectiveness and efficiency of implementing their statutory goals. This applies above all, to large, well-developed cities in which, according to the analysis of survey responses, the level of development of business incubators and technology parks is rated the highest. In the context of the role of urban entrepreneurship in the creation of start-ups in practice, individual entrepreneurship of inhabitants, which is best assessed by city authorities, will also be of great importance. It should be remembered that it cannot constitute the only stimulant for the development of start-ups.

The above conclusion is particularly important in view of the least importance of municipal support reflected in the obtained model. The least important for the creation of start-ups is the involvement of the city in the process of their creation and in the promotion of this form of entrepreneurship. An increase in municipal support by one unit results in an increase in the number of start-ups by 0.108. Meanwhile, in practice, activities of Polish cities are assessed quite well (when compared to other conditions) and for that reason they should constitute real help for potential entrepreneurs.

## 5. Discussion

In the context of previous research conducted on start-ups, the obtained results indicate a low level of development of this type of entrepreneurship in Poland as an emerging economy, which may now and in the future hinder the growth of innovativeness because, as emphasized in the introduction, it is an important determining factor of urban and national economic development [14–17]. Poor interest in start-ups may also reduce the process of knowledge transfer and diffusion in cities, and thus, slow down their technological and social progress.

The results confirm the importance of human and financial resources in the creation of start-ups described in the references [8,12,18,40,43,46]. In Polish cities, resource conditions have the strongest impact on the development of this form of entrepreneurship. The most important determinant of the existence of start-ups—regardless of their location—is the availability of intellectual and financial capital. Given the specificity of start-ups, this is a rational and logical conclusion confirmed by the authors' research and previous publications [53,54,56,58]. In this context, the role of the city is to take care of improving human resources and attracting potential investors [63,68,73,74,76].

It is worth adding here that while the level of education of Poles is systematically increasing, their income situation is improving slowly, which may have a negative impact on the technical possibilities of creating start-ups, but may also be a stimulus for business initiatives associated with the possibility of independently improving the financial situation. Individual entrepreneurship, whose level was rated the highest, is not at risk. However, the lack of funding for start-ups is a serious barrier to development due to the importance of this determining factor repeatedly highlighted in the literature. Poland is not a country abundant in venture capital. It also lacks sufficient public resources, and public-private partnerships are very often associated with suspicions of corruption and misappropriation of budgetary capital.

However, the research results do not confirm the dominant importance of business incubators and technology parks in the development of start-ups. In the literature and previous studies, it is assumed that these entities are established primarily to transfer the latest knowledge to business and to support entrepreneurs in the process of starting a



business [83,84,86–90]. In the obtained ranking of determinants, they should play a more important role than shown, as their establishment was supposed to cede some of the local and regional responsibilities to institutions specialized in supporting entrepreneurship. It seems that this task in Poland has not produced the expected results. This may result from two circumstances. The first one may be a low level of development of such entities in Polish cities. The second is their potential ineffectiveness. Regardless of the reason, cities should nevertheless make efforts to strengthen the rank of business incubators and technology parks in view of their involvement and resources devoted to their establishment.

An important conclusion from the analysis is also the confirmation of the existence of a positive impact of cities on the creation of start-ups [80–82,84]. This means that the models of economic helices, in which one of the key relations is the city-business interaction, function in practice [7,95] and in the reality of developing economies, of which Poland is part. Thus, the city can play the role of an important stakeholder in strengthening local entrepreneurship and supporting the creativity of its inhabitants. It is worth adding, however, that a city supporting open innovations and start-ups needs well-motivated employees who are aware of their role. At the same time, acquiring creative and responsible representatives for public service is a difficult task [102], especially in developing economies, where city authorities cannot always offer attractive salaries for officials. It is also important to remember that public service motivation differs from country-to-country.

Nevertheless, the weakness of this influence points to the necessity to strengthen the city—science—business bond as the current determinant of entrepreneurship development. The research shows that Polish cities have a lot to do in this respect, including above all, in the area of cost-free promotion of start-up initiatives, and in the area of activating business incubators and technology parks towards real assistance for start-ups.

Despite many improving conclusions formulated for Polish cities, it is worth emphasizing that city authorities—even in emerging economies—are aware of their role in shaping entrepreneurial attitudes and supporting open innovation. This confirms the thesis that the level of urbanization is significantly related to the development of the most modern forms of conducting business initiatives such as start-ups. A lot of contemporary research confirms the increasing role of cities as a driver for open innovation and entrepreneurship [103]. In this context, a useful dimension of collaborative economics is realized.

Such a supporting role of the city is also observed in other developing economies, and therefore it is worth cultivating. An example is the involvement of local Chinese authorities in favor of the ecosystem and balancing economic with social and ecological priorities (the Suzhou-Wuxi-Changzhou region in China) [104]. In matters of general wealth and the quality of life of future generations, the city can act as an effective coordinator of local development policy, becoming a driving force for open eco-innovations. A similar action of municipal authorities was described on the example of Mexico (La Boquita Coastal System, Manzanillo, Mexico). In that example, one of the tourist regions the authorities proposed the improvement of the sanitary infrastructure and the planning of the occupation of space for recreational use, aiming to change the trends related to the pressures that threaten the environmental health [105].

Open innovation works very well for start-ups in the form of restaurants [106,107]. Innovation then comes down to the use of healthy, ecological ingredients in dishes or traditional local cuisine. Such start-ups favor the development of local tourism and can be created together with cities for their synergistic development. A great example in this area is Chez Panisse, which used an open innovation frame-work to grow from a small firm to a successful business ecosystem that shares knowledge, encourages individuals' growth, and embeds trust among participants [108].

## 6. Conclusions

To sum up, the research conducted in this paper fills a research gap reporting on the identification of the direction, strength, and hierarchy of the influence of urban conditions on the development of start-ups. They also provide insight into the actual impact of city governments on local and regional entrepreneurship. The results of the research indicate the dominant role of resource determinants in the creation and development of start-ups, including primarily financial and intellectual capital. Therefore, cities should actively work on obtaining and maintaining these capitals. To a lesser extent, incubators and technology parks contribute to the development of start-ups, which in connection with the fundamental purpose of the existence of those entities, implies the need to improve the effectiveness and efficiency of their operations. The least important role in the creation of start-ups is played by the direct involvement of city authorities in their creation and promotion of this form of entrepreneurship. Nevertheless, it should be emphasized that it is a positive and important role.

Based on the research, some of the following recommendations can be made for urban economics and management:

- cities should actively participate in the creation of local entrepreneurship, as this encourages the development of start-ups;
- city authorities interested in the creation of start-ups should first focus on providing them with access to intellectual and financial capital of high quality and sufficiency;
- the operations of business incubators and technology parks should be monitored and evaluated in terms of effectiveness and efficiency of support for start-ups.

The main research limitation of the present discussion and conclusions is the national level of conducting the research. This is a limitation typical of a case study. The results of the analyses may be directly applicable to a single geographical area, which may decrease their cognitive value and universality. However, the conclusions drawn from the case study research, which is consistent with the phenomenological paradigm, explain the unique phenomena that may be valuable in a different setting and in a different organization as an interpretation of the phenomena, but may not be entirely predictable in the future.

Nevertheless, this research is representative for the population of 930 cities in Poland. Due to the universality of the research model, they can also be used for comparative analyses conducted in other cities, and in developing and developed countries. Moreover, only city authorities were included in the surveys. Entrepreneurs and the creators of start-ups were not surveyed, which may have narrowed the cognitive horizon.

These limitations indicate directions for further research that could be conducted in other countries or involve other urban stakeholders. Additionally, threads on the effectiveness of technology parks and business incubators could be enriched.

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