The quality of inter-organizational relations and the intention of commercialization of knowledge by academic entrepreneurs – a theoretical approach and outline of research

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Introduction

Universities and their immediate surroundings are places that play a key role for contemporary societies in the field of education and generating the latest knowledge\(^1\). Over the past decade, researchers have started to see university and its environment as a special ecosystem supporting entrepreneurs in developing their business ideas\(^2\).

Academic entrepreneurship ecosystems are established by a network of different institutions and entities: universities, business incubators, technology transfer centres, financial support institutions, etc. involved in supporting academic entrepreneurship. High-quality relationships between entities engaged in this ecosystem can affect the loyalty of the partners involved in such cooperation – their behaviour,


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willingness to become involved and help – and are thus an important factor conducive to achieving a better result of cooperation in terms of the commercialization of knowledge. In general, entrepreneurial ecosystems regulate the nature and quality of entrepreneurial activities and also set up the types of organizational forms that will be accepted as legitimate (e.g. the creation of a new spin-off).

The current direction of European policy is focused on the development of innovative undertakings, which causes, among others, increased interest in academic entrepreneurship, the search for new forms of technology transfer, stimulation of developing academic spin-off companies, and motivating the academic environment to take economic initiatives. The topic of the academic entrepreneurship ecosystem is already present in the literature on the subject and in recent years the meaning of the support ecosystem as a key factor in extending academic entrepreneurship has been underlined. The ecosystem is understood often as a “connector” that bridges people, ideas and resources in academia, and local communities are particularly important for early stage projects, as they facilitate access to stakeholders in the community who are in a position to offer often required critical support.

However, there is a lack of conceptual grounds that would create a field to start empirical research in the context of research on how high quality relations between entrepreneurial scientists and their partners from the widely understood entrepreneurial ecosystem can influence the intention of commercializing research results.

The article answers the following research questions in detail:

Q1: What institutions/entities play an important role in building an ecosystem supporting academic entrepreneurship?
Q2: What factors shape the quality of inter-organizational relationships in supporting academic entrepreneurship?
Q3: How can we examine the impact of high-quality inter-organizational relationships on intentions to commercialize knowledge by academic entrepreneurs (what variables can the model to explore this dependency contain)?

The article uses the desk research method, with the aim of diagnosing the main research trends in the study of the quality of inter-organizational relationships and their impact on the willingness to commercialize research results by the academic community. By analysing the available literature, the variables key to developing a construct for measuring the quality of inter-organizational relations might thus be brought into focus.

The article is organized as follows. Section 1 (above) is an introduction. Section 2 provides a review of the modest but emerging literature that explores the essence

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of university entrepreneurship, its ecosystem, and the importance of inter-organizational relationships that can support academic entrepreneurs. Part 3 discusses the methodological approach used in this study. Finally, conclusions, limitations and implications for future research are discussed.

Theoretical background

Academic entrepreneurship and its ecosystem

In recent years, the concept of academic entrepreneurship – also referred to as technological entrepreneurship, innovative entrepreneurship, intellectual entrepreneurship and technostarters, among other names – has developed all over the world. The term “academic entrepreneurship” was originally intended to refer to the extension of entrepreneurship to the academic community and only to distinguish between companies based on academic knowledge and those based on other knowledge. Dominant definitions in English-language literature subsequently changed the concept of establishing profit-oriented enterprises at universities and focused on the basic role of university spin-offs. Later, other authors proposed a view on academic entrepreneurship as a way of transferring knowledge from the university environment to the market. This broader interpretation of academic entrepreneurship covered any academic interaction with business entities that forms the basis for creating market value. In a simpler approach, academic entrepreneurship is defined as the synthesis and integration of scientific, academic and commercial activities. This is often characterized by formal arrangements for the commercialization of intellectual property of academic goods through knowledge (e.g. business consultancy or industry-commissioned research), technology transfer (e.g. patents or licences), and transfer of products or services through established spin-off companies⁴. Academic entrepreneurship takes place at the level of individuals or groups operating independently or within faculties or other university units that create new organizations or initiate innovation within or outside the university⁵.

While early publications on the subject of academic entrepreneurship focused mainly on measuring the frequency of knowledge transfer at universities (patents,  

licences, spin-offs) and analysing initiatives that could affect the effectiveness of this activity⁶, attempts are increasingly being made to analyse the entities and factors that shape the ecosystem of academic entrepreneurship or show the results of effective cooperation between ecosystem participants⁷. Entrepreneurial ecosystems include numerous entities and various processes at many levels of stakeholder cooperation⁸. The idea underlying the widespread use of the term ecosystem in social sciences was developed in the 1980s and 1990s, but it only spread after the work of Moore⁹, one of the first researchers to introduce the concept of the ecosystem in the business environment. The definitions of the entrepreneurial ecosystem indicate that it is “a set of networked institutions designed to help entrepreneurs go through all stages of the development process of a new venture”¹⁰. This can be understood as a network of services in which the entrepreneur is at the centre of activities and the measure of his success is the effective commercialization of scientific knowledge¹¹.

An entrepreneurial academic support ecosystem has many dimensions. It includes entrepreneurship incubators, accelerators, grants, and business plan competitions. Such an ecosystem also has vital formal and informal rules and regulations for governing the entrepreneurial activities of academic society¹². As part of the process of supporting academic entrepreneurship, there are a number of relationships between various entities, i.e. the university itself, employees, students, doctoral students, enterprises and other units and environmental factors. The quality of relations between the entities involved in supporting academic entrepreneurship can be understood as the added value shaped by the type of bond between the subjects of exchange characterized by the degree of compatibility of organizational cultures, decision-making styles and the convergence of perceived values. A more detailed analysis of the entities involved in supporting academic entrepreneurship (in which it is important to maintain long-term relationships

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⁷ M. Perkmann et al., Academic Engagement…
⁸ D.J. Isenberg, How to Start…
¹⁰ Ibidem.
with the environment) reveals three groups: entities closely related to academic entrepreneurship (AE), entities that are a potential environment for AE, and partners that can support AE (Figure 1). Properly nurtured relationships between these entities may contribute to the intensification of entrepreneurial activities of persons referred to as academic entrepreneurs.

![Diagram of ecosystem entities](image)

**Figure 1. Ecosystem of academic entrepreneurship support**

**Source:** own study based on a literature review.

Ecosystem entities, known as ‘links’ connecting people, ideas and resources in academia and local communities, are particularly important for projects at an early stage as they facilitate access to community stakeholders who are able to offer the often required critical support. The following features of an ecosystem have been identified in the relevant literature: exceptional character – which confirms why it is difficult to copy the way the Silicon Valley ecosystem works;
multidimensional and unambiguous relationships in the ecosystem, where high-quality relationships between the various entities in the ecosystem are based on trust, satisfaction and commitment.

University authorities are the natural source initiating the process of promoting academic entrepreneurship and shaping the support ecosystem, and its main recipients are scientists, students, graduates, doctoral students and lecturers. The university also has the option of separating the unit within its structure, acting to support academic entrepreneurship (e.g. an incubator, career office, entrepreneurship centre) or have its representatives in the structure of other supporting institutions (e.g. science and technology parks, technology transfer centres). The proposal to create a support structure may also emerge from outside, e.g. from another institution, i.e. a regional development foundation or entrepreneurship development agency implementing a project from external funds, e.g. from EU funds. It is the initiators creating the support structure that are expected to be most involved in coordinating the process of academic entrepreneurship.

Quality of inter-organizational relations

In order for the academic entrepreneurship support ecosystem to deliver the assumed results, i.e. to intensify the entrepreneurial attitudes of people associated with the university, there must be interaction between the academic community and support entities that is based on commitment, trust and cooperation. In other words, the relationship between support participants must be of high quality.

The quality of relations between entities involved in supporting academic entrepreneurship can be understood as added value shaped by the type of links between exchange entities, and is characterized by the degree of compliance of organizational cultures, their decision-making styles and a convergence of perceived values. A properly shaped level of quality of relations between these entities may contribute to the intensification of entrepreneurial activity of persons called academic entrepreneurs. There are many previous studies discussing the concept of relationship quality. The concept has been defined from different perspectives (re-
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In the relevant literature, the quality of relationships is defined variously as:

- a general evaluation of relationship strength and the extent to which a relationship meets the needs and expectations of the parties involved based on a history of successful or unsuccessful encounters or events\textsuperscript{15};
- a higher-order construct, which includes factors such as trust, commitment, communication, an absence of conflict, satisfaction, deciding to what extent the relationship can meet the needs of a given entity\textsuperscript{16}.

However, for most researchers, the quality of relationships is based on three aspects: trust, commitment and satisfaction\textsuperscript{17}. Recent studies also show other variables important for the quality of relationships, i.e. communication understanding and no conflict of interest\textsuperscript{18}.

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\textsuperscript{15} C.P. Lin, C.G. Ding, Evaluating group differences…

\textsuperscript{16} L. Danik, Wpływ kultury na jakość relacji w międzynarodowej współpracy przedsiębiorstw, Oficyna Wydawnicza SGH, Warszawa 2017.


The literature on the subject shows the positive effects of high-quality inter-organisational relations, i.e. the results of cooperation\(^\text{19}\), the expected length of cooperation\(^\text{20}\); willingness to recommend\(^\text{21}\), rarer opportunistic behaviour\(^\text{22}\), and the impact on future intentions to maintain relationships\(^\text{23}\). Such positive effects of high-quality relationships can also be seen in the context of cooperation between academic entrepreneurs and institutions supporting them. Also, insights have been published regarding the importance of good relationships and support from ecosystem entities:

- good relations of scientists with special units at their universities, such as research centres, have a positive impact on their involvement in entrepreneurship\(^\text{24}\);
- the importance of supporting academic entrepreneurs from universities and faculties\(^\text{25}\) as well as technology transfer centres in commercializing research results\(^\text{26}\);
- the presence of a formal relationship in technology transfer mechanisms is generally positively related to commercialization\(^\text{27}\);
- there may be a temporal relationship between involvement and commercialization, in the sense that earlier involvement of scientists in cooperation with industry can subsequently lead to commercial production\(^\text{28}\).


\(^{23}\) M. Perkmann et al., *Academic Engagement…*


\(^{28}\) M. Perkmann et al., *Academic Engagement…*
Given the broader spectrum of modern university activities, is perceived as having the largest role in creating the right quality of relationships between entities directly or indirectly related to academic entrepreneurship, activating entrepreneurship and ensuring lasting, appropriate quality of relationships between various stakeholders. To a large extent, the position of local and regional technology parks, incubators, and university technology transfer offices depends on strong, trust-based and committed relationships between the university, local government and business. Social psychologists say that commitment and trust play a key role in shaping motivation and behaviour in relationships. All these institutions are responsible for creating a climate favourable to entrepreneurship, promoting and disseminating knowledge about entrepreneurship in the form of training, promotional campaigns, organization of advisory points, etc. These activities should become a priority in the process of overcoming one of the most serious barriers to the development of good relations between entities involved in promotion of academic entrepreneurship, namely mental barriers, lack of awareness of the benefits of commercializing science and fear of the risks associated with running your own business.

**Methodology and conceptual model**

The article uses the desk research method, which aimed to:

- identify factors shaping the quality of relationships maintained in supporting academic entrepreneurship;
- identify the relationship between the quality of relationships in the area of supporting academic entrepreneurship and the intention to commercialize knowledge.

An analysis of the relevant literature was intended in particular to bring into focus the variables important in the development of a construct for measuring the quality of inter-organizational relations. As a result of this literature review, a theoretical model was proposed to examine the quality of inter-organizational relations and their impact on the intention of commercialization of knowledge by academic entrepreneurs.

The construct for testing the quality of inter-organizational relations proposed in this article contains criteria described and discussed in the literature. These include such variables as trust, commitment, communication, satisfaction, no conflict of interest, and expected benefits. After considering the review of the literature on the study of the quality of inter-organizational relations, a construct was

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proposed explaining the variables shaping the quality of relationships (RQ) and its impact on entrepreneurship attitudes of the academic community (IC) (Figure 2). Six variables were recognized as predecessors of the variable “relationship quality” – trust (T), communication (C), engagement (E), satisfaction (S), no conflict of interest (NC), and expected benefits (EB). Each of the variables in the model has its justification in literature or previous empirical studies.

Items proposed by Leonidou et al.30, Danik31, Ulaga and Eggert32 can be used to measure the variable “trust”. Items proposed by Tung and Carlson33 and Hoppner et al. 201534 can be used to measure variable “engagement”. Items proposed by Leonidou et al.35, Lages36 and Hennig-Thurau et al.37 can be used to measure the variable “communication”. Items proposed by Leonidou et al.38, Lages39 and Hennig-Thurau et al.40 can be used to measure “satisfaction”. Items proposed by Hoppner et al.41 and Danik42, can be used to measure the variable “no interest conflict”. Items proposed by Danik43 and Whipple et al.44 can be used to measure the variable “expected benefits”. It was assumed that all the indicated variables have a positive impact on the quality of relationships in supporting academic entrepreneurs.

In connection to the above, Appendix 1 gives examples of specific items that explain the main variables of the model and can be included in the survey questionnaire.

31 L. Danik, *Wpływ kultury…*
32 W. Ulaga, A. Eggert, *Relationship Value…*
34 J. J. Hoppner, D. A. Griffith, R. C. White, *Reciprocity in Relationship Marketing…*
39 C. Lages, C.R. Lages, L.F. Lages, *The RELQUAL scale…*
41 J. J. Hoppner, D.A. Griffith, R.C. White, *Reciprocity in Relationship Marketing…*
42 L. Danik, *Wpływ kultury…*
43 *Ibidem.*
In addition, based on the literature review, an assumption was made regarding the positive impact of the quality of relations between academic entrepreneurs and their supporting institutions on the intention of commercialization of knowledge by academic entrepreneurs (Figure 2).

**Figure 2.** Theoretical model of intention to commercialize research results by academic entrepreneurs and the impact of relationship quality

Source: own elaboration.

Modelling using structural models can be proposed as the main method for model verification. Modelling helps fill the scientific cognitive gap in key variables shaping the quality of relationships in the environment of the academic entrepreneurship support ecosystem and its impact on intentions to commercialize research results. The study plans to use statistical techniques such as descriptive statistics, discriminant analyses for many groups.

A pilot study using a questionnaire can be carried out among research workers involved in research and/or teaching at a selected technical or medical university, where there is a greater likelihood of commercializing research results than at other types of universities. After testing the research tool and eliminating unnecessary or incomprehensible questions, such research can be carried out on a larger scale or as part of an international comparison.
Discussion and conclusions

This study is an early preparatory phase for a broader study of the impact of high-quality inter-organizational relationships on the intentions of commercialization of knowledge by the academic community. In particular, attempts were made to answer the research questions contained in the introduction to the study. To the question of what institutions/entities play an important role in building the ecosystem supporting academic entrepreneurship, the literature indicates that the university is the natural place initiating the process of promoting academic entrepreneurship. The university also has the option of separating the unit within its structure, acting to support academic entrepreneurship (e.g. incubators, career offices, entrepreneurship centres) or may have representatives in the structure of other institutions supporting the ecosystem (e.g. science and technology parks, technology transfer centres). Taking into account its broader spectrum of activity, a modern university is perceived as having the greatest role in creating the right quality of relations between entities directly or indirectly connected with academic entrepreneurship, activating entrepreneurship and ensuring lasting, appropriate quality of relations between various stakeholders. To a large extent, the position of local and regional technology parks, incubators, as well as university technology transfer offices depends on strong trust and commitment-based relations between the university, local government and business.

Answering the question about the factors that shape the quality of inter-organizational relationships, for most researchers, the quality of relationships is based on three dimensions: trust, commitment and satisfaction. Recent studies also show other variables important for the quality of relationships, i.e. communication or involvement in the relationship and no conflict of interest. These variables can be taken into account in preparing a questionnaire for testing the level of relationship quality in support of academic entrepreneurship among the academic community.

Regarding the last research question as to how we can examine the impact of high-quality inter-organizational relationships on the intention of commercialization of knowledge by academic entrepreneurs, after literature analyses and the results of available empirical research, a research tool was proposed to examine the impact of specific factors of relationship quality and their impact on the intention of commercialization of knowledge among academic entrepreneurs (Appendix 1).

The model developed in the article explaining predictors of the quality of relationships and its impact on the intention of commercialization of knowledge by academic entrepreneurs (Figure 2) may significantly enrich the literature related to the entrepreneurial intentions of academic teachers with such aspects as:
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- the role of high quality inter-organizational relations in supporting academic entrepreneurship;
- factors shaping high quality inter-organizational relations in supporting academic entrepreneurship;
- the impact of high-quality inter-organizational relationships on intentions to commercialize knowledge.

The planned study is innovative due to the context of its implementation. There are no national studies available on the identification of factors affecting the quality of relationships that support academic entrepreneurship and its impact on the intention of commercialization of knowledge. The concept has also important implications for practitioners. First, for policy makers who, in addition to incorporating the results of commercialization into many of their assessment processes, should also promote entrepreneurial culture at universities based on high quality inter-organizational relations and shaping high-quality relationships across the entire academic entrepreneurial support system. Therefore, the author believes that it is worth comprehensively identifying the main determinants of the intention to commercialize knowledge, related to high quality relations with partners of supporting ecosystem. Secondly, the model suggests that managers of universities must be aware that the best way to promote entrepreneurship in their institutions is to create the conditions necessary to increase the entrepreneurial attitudes of their employees through various projects (training, study, cultural) aimed at strengthening creativity and shaping entrepreneurial values.

Acknowledgements
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Appendix 1. Main predictors of relationship quality and intentions to commercialize research results, based on literature

<table>
<thead>
<tr>
<th>No.</th>
<th>Construct/Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>I. TRUST</strong></td>
</tr>
<tr>
<td>1</td>
<td>Trust is key to my relationships with partners in the field of implemented projects</td>
</tr>
<tr>
<td>2</td>
<td>The partner I work with is trustworthy</td>
</tr>
<tr>
<td>3</td>
<td>The partner’s behaviour during cooperation is predictable</td>
</tr>
<tr>
<td>4</td>
<td>I don’t want to disappoint my partner and my partner doesn’t want to disappoint me</td>
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<tr>
<td></td>
<td><strong>II. ENGAGEMENT</strong></td>
</tr>
<tr>
<td>5</td>
<td>The partner fulfils his obligations when I work with him</td>
</tr>
<tr>
<td>6</td>
<td>The partner desires good relations with me in developing my projects</td>
</tr>
<tr>
<td>7</td>
<td>I am very involved in relationships with my partner during cooperation</td>
</tr>
<tr>
<td>8</td>
<td>The partner understands my needs</td>
</tr>
<tr>
<td>9</td>
<td>The partner does not want to disappoint me during the cooperation</td>
</tr>
<tr>
<td></td>
<td><strong>III. EXPECTED BENEFITS FROM COOPERATION</strong></td>
</tr>
<tr>
<td>10</td>
<td>Cooperation with a partner gives me more benefits than if I had carried out the project myself</td>
</tr>
<tr>
<td>11</td>
<td>It is not possible to carry out my projects without a partner</td>
</tr>
<tr>
<td>12</td>
<td>Cooperation with a partner reduces the risk of my project’s failure</td>
</tr>
<tr>
<td>13</td>
<td>A partner’s support is key to commercializing my research results</td>
</tr>
<tr>
<td></td>
<td><strong>IV. COMMUNICATION</strong></td>
</tr>
<tr>
<td>14</td>
<td>The flow of information is correct between me and the partner</td>
</tr>
<tr>
<td>15</td>
<td>Together with the partner, we have developed a way of providing information</td>
</tr>
<tr>
<td>16</td>
<td>I don’t hide any information from my partner</td>
</tr>
<tr>
<td>17</td>
<td>The partner does not hide any information from me</td>
</tr>
<tr>
<td></td>
<td><strong>V. SATISFACTION FROM COOPERATION</strong></td>
</tr>
<tr>
<td>18</td>
<td>I am pleased with the cooperation with a partner in supporting me in the implementation of projects</td>
</tr>
<tr>
<td>19</td>
<td>Cooperation between me and my partner is going well</td>
</tr>
<tr>
<td>20</td>
<td>I sense a good rapport while working with a partner</td>
</tr>
<tr>
<td>21</td>
<td>Satisfaction is greater when I implement a project with the support of a partner</td>
</tr>
<tr>
<td></td>
<td><strong>VI. NO CONFLICT OF INTEREST</strong></td>
</tr>
<tr>
<td>22</td>
<td>Any conflict with the partner is resolved through negotiation and compromise</td>
</tr>
<tr>
<td>23</td>
<td>There are often conflicts in cooperation with a partner</td>
</tr>
<tr>
<td>24</td>
<td>The conflict with the partner is calculated in the risk of the project being undertaken</td>
</tr>
<tr>
<td></td>
<td><strong>VII. INTENTION TO COMMERCIALIZE KNOWLEDGE AND TECHNOLOGY TRANSFER</strong></td>
</tr>
<tr>
<td>25</td>
<td>I intend to work with the future partner(s) in the field of commercialization of my research results/involvement in business activities/technology sales and transfer/commercialization of knowledge in the form of patents, licences, utility models, consultations, commissioned works, reports</td>
</tr>
<tr>
<td>26</td>
<td>I will certainly cooperate with support institutions in the field of knowledge commercialization</td>
</tr>
<tr>
<td>27</td>
<td>If I had to choose whether to act alone as an entrepreneur or in cooperation with a partner, I would choose cooperation</td>
</tr>
<tr>
<td>28</td>
<td>I definitely plan to commercialize the results of my research</td>
</tr>
<tr>
<td>29</td>
<td>I intend to maintain good relations with my partner(s) in the area of knowledge commercialization in the future</td>
</tr>
</tbody>
</table>
References


The main purpose of this article is to develop a framework to study the impact of high-quality inter-organizational relationships (between scientists and supporting institutions) on academic entrepreneurs’ willingness to commercialize research results. The concept of the theoretical model was developed on the basis of a literature review and available empirical research results. The specific objectives of the article include the identification of key institutions supporting academic entrepreneurs, and the identification of factors building the quality of inter-organizational relations. The developed model is only a preliminary and partial proposal to measure the intent of commercializing research results by academic entrepreneurs, taking into account one of the important aspects of this process, namely the quality of relationships.

**Keywords:** academic entrepreneurship, inter-organizational relations, quality of relationships