Research Article

Business Opportunity Ontology

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Abstract.
Ontologies are used to describe and share information, by describing a concept and defining related entities and their relations, attributes, and properties. More specifically they can be used to describe and share knowledge, using a language that computers can understand and share, and; therefore, form the pillar of the Semantic Web. The study examines the concept of business opportunity ontology from an entrepreneurial point of view.
The study also examines the methodologies and best practices used in ontology development, and the use of the Protégé tool for the actual development of Ontology. Several standards were set in order for Ontology to be further used in future entrepreneurial research. These standards include a) the concept of business opportunity was developed based upon related academic theory (using the entrepreneurship, management, and business administration domains), b) as a consequence, only entities, relations, and properties that had been included in the academic literature were included in the ontology, c) the methodology had to be clearly defined since there was not a single methodological approach for ontology development, and d) the appropriate tool was selected.

Keywords: business opportunity, ontology, entrepreneurship

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1. INTRODUCTION

The study examines the concept of “business opportunity” and proceeds to the development of an Ontology. It is important to be able to define, identify and evaluate “business opportunities” for the domains of entrepreneurship and business studies. This stands for for many members and stakeholders of the real world business ecosystem (entrepreneurs, investors, etc). It becomes clear that the development of such an ontology creates value to the specific domains. In addition, specific types of stakeholders

may realize additional value by expanding the ontology to fit their own criteria in the future.

A variety of methodology issues are examined during the development of the ontology. First, the “business opportunity” Ontology developed is based upon an entrepreneurial approach of the concept of business opportunity.

Second, each entity, relationship or concept linked to the concept of business opportunity is supported by relevant theory from the domains of entrepreneurship, marketing and business administration. Setting this as a standard for the present Ontology “Business Opportunity” had several direct effects. This approach provides a higher degree of objectivity and less bias when dealing with entities, relationships and other comments (since relevant academic reference was required in order to be included). As a result the “Business Opportunity” Ontology is based on a sound academic background and can be extended in the future either with the inclusion of new findings of academic research, or by building extensions which focus on specific sectors (e.g. investments or real estate and real estate development sectors).

Third, the methodology for identifying key concepts to be used in ontology building was chosen – a middle out methodology approach was used where related concepts and entities were identified, their direct relationship with the concept of business development been documented and supported by relevant academic literature and then included in the ontology as classes, attributes or restrictions.

Finally a proper Ontology development software tool was selected; Protégé was selected due to the suitability of the software features and the fact that represents by far the most commonly used ontology development software tool.

Adoption of these standards has a number of side effects. First of all, it becomes difficult to connect this ontology with other ontologies already developed since a) in case these ontologies are not based on academic documentation, their standards are different b) the framework and the approach used can result a different concept, meaning and relations to the same word. E.g. the terms “Product” and “New Product” have different meaning (and as a result different conceptualization, attributes and properties) if examined and defined as part of an entrepreneurial process and activity and as part of a manufacturing process and activity. As a result, it is suggested to be really careful when attempting integration or use of other ontologies, based on these two criteria (academic support and same conceptualization of terms which may appear to be the same but have a different concept when examined within different frameworks).

2. ONTOLOGY -- DEFINITIONS & USAGE

There are several definitions used regarding “Ontology” both in Philosophy and Information Technology (Computer Science). Borst (1997) defines ontology as a formal specification of a shared conceptualization, while Gruber (1994) defines ontology as an explicit specification of conceptualization, and therefore highlights the role of ontology as a way to analyze concepts in detail and present knowledge in a detailed, commonly accepted and simplified way. Uschold (1996) defines ontology as a framework for the representation of concepts and relationships between them.

The reason for Ontology development lays on the need to exchange information in an effective way, in order for complex processes to be defined and understood between parties; ontology helps in the distribution of knowledge. Creating a common ground for the description of complex concepts enable different parties to exchange information more accurate and build on the existing knowledge. Ontology also provides further details for the structure of information between the parties who wish to exchange information, by describing several entities and relationships directly related to the concept in question. (Noy *et al.*, 2001).

Ontology’s are organized in ontology libraries, with the main purpose to facilitate access to Ontology and exchange of evaluations regarding the different ontologies. Naskar *et al.* (2016, p. 1) describe the organization of Ontologies and their purpose as follows: “The goal of an ontology library is of two-fold: (i) to provide a platform to the ontologists (a practitioner who builds the ontologies) to publish, store, preserve, share and evaluate the ontologies; (ii) to facilitate the ontofiers (an ontology user) to retrieve the right ontology at the right time to make the best (re)use of it.”

The present ontology can be used:

1. As a basis for further ontology development regarding Business Opportunity and Entrepreneurship Areas
2. For offering a common vocabulary and conceptualization across the Entrepreneurial Business Opportunity Ontology Domain
3. To provide a basis for the formation of databases related to Business Opportunities and Entrepreneurship
4. To provide an understanding (using Ontology) for machines (PCs) to share the conceptualization of Business Opportunity in terms of Entrepreneurial Domain and the related key concepts.

5. To be used for educational purposes and examples.

6. Can be used for Business Analysis Purposes, and more specifically for Product Analysis and Business Model Analysis.

3. A REVIEW OF ONTOLOGY DEVELOPMENT METHODOLOGY & TOOLS - PROTEGE

The concept of ontology building is defined as the graphical visualization of ontology and as the "conceptualization of a domain into machine readable format" (Sikoumar *et al.*, 2011, p. 1). Gawich *et al.*, (2012) highlight the need to study and examine the key relationships on each specific domain, in order to use on semantic web. "Ontologies are becoming the cornerstone of semantic web. Ontologies aim as capturing domain knowledge in a generic way and provide a commonly agreed understanding of the domain." (Malviya *et al.*, 2011, p.1)

More recent research highlights the need to develop ontology based on specific methodologies (Ahmad *et al.*, 2013) which are also expressed in selected tools (software programs) used for ontology building. For this purpose the ontology will be based on the methodology used by Protégé software, a tool commonly used for ontology development.

Further studies (Cardoso, 2007, Tudorache, 2013) highlight the functionality of Protégé software tool and compare Protégé with other programs. Protégé appears to be the most widely used ontology development tool with a market share of about 70% followed by Swoop, Onto Edit. TextEditor, Altova Semantic Works, Onto Studio and other Ontology building software solutions (Chimaera, Ontolingua, OilEd). "Protégé is an ontology and knowledge base editor produced by Stanford University." (Malviya *et al.*, 2011, p.3)

Based on the available tools examined, Protégé became the tool selected, for the reasons mentioned above; however this choice had several side effects, as described below. The current version of Protégé is 5,5.

To proceed with Ontology Development, a number of concepts and graphical presentation of the relationship between the concepts has to be defined and designed, such as:

1. **Classes** are concepts related to a specific field. They form the core of an Ontology. They can be categorized to hyper classes and subclasses, with subclasses been more specific from hyper classes.

2. **Attributes (**Properties) are the characteristics of classes and explain or define the classes

3. **Relations** define the relationships between the concepts of a field, such as “has”, “is part of”, “connects to”

4. **Instances --** are specific class members

5. **Restrictions** – a limitation or restriction that is applied to an ontology or entity

6. **Axioms** – relationships and facts that are applied by definition

The search for a solid ontology development methodology has been a long and inconclusive one. “In the last decades many methods for ontology construction and ontology evaluation have been proposed. However, none of them has become a standard and there is no empirical evidence of comparative evaluation of such methods.” (Duke – Ramos *et al.* 2014, p.1)

Different methodologies are also used in Ontology Development, mainly:

1. Top Down Analysis (Start from the top proceed with analysis of lower levels)

2. Bottom Up Analysis (Start from the bottom and build up)

3. Middle Out Analysis (Identify key Concepts and connect them into the ontology)

Top down analysis requires starting with the more generic (basic and inclusive) concepts and then inclusion the more narrow concepts (specialized concepts). Bottom up requires starting from the more special concepts and advance to more general concepts. The combination includes defining the most well known concepts and then we create both more generic and more special concepts. Table 1 below provides an Example of an Ontology’s Taxonomy.

Previous studies (Fernandez *et al.*, 1997) argued that Ontology development was more than an art than science due to the limited cross-science cooperation between ontology scientists and their colleagues from respective domains. Another reason can be differences of the same concept when reviewed across different sciences; e.g. several ontologies may refer relevant tangible concepts and relationships, however they may miss related concepts from a legal, financing or other perspective. More recent research (Boeker *et al.*, 2013) indicated that there were significant effects on the performance of ontology developers through guideline based training.

Table 1: Example of an Ontology's Taxonomy.

Taxonomy Type	Example
Class	Person
Subclasses	Man OR Woman (Gender)
Attributes	Cell Phone, Car, House
Relations	Has, Owns Part of Humanity
Instances	Haris Hara, Kiriakos, Amelia, Nikos
Axioms	Basic Logical Principles Can be used to confirm an ontology's reasoning and consistency. Can be used for classes, attributes and instances.
Reasoning	Checks Consistency and the logical contradictions of the ontology
Restrictions	Limitations

4. ACADEMIC LITERATURE REVIEW ON BUSINESS OPPORTUNITY

Defining a "Business Opportunity" is a critical factor for business, economic and social success. This affects established business and start-up entrepreneurs, who follow different patterns to innovate and pursue business opportunities, individual investors and Venture Capital companies, who support financially new business ventures and the potential customers, either in the form of business or consumers, who are able and willing to explore benefits through the development and commercial availability of new product propositions.

Creation of the "Business Opportunity Ontology" may enable future entrepreneurs and business to adopt a standard methodology for identifying and potentially evaluating business opportunities, therefore securing an early competitive advantage.

Trott, (1998, p.140), defines "Business Opportunity" as "a possible technical or commercial idea that may be transformed into a revenue-generating product." However this is only one approach, product & technology centered, ideally through the lenses of entrepreneurship theory.

Academic literature provides a wide range and definitions of "business opportunity", and many factors that determine business success, which can also be used as consisting elements of business opportunity. The study reviews the key types of knowledge that are important to entrepreneurs and start-up companies. Muzyca (1999, p. 28) defines entrepreneurship as "the ability to identify, pursue and capture the value from business opportunities'', while Steve Blank's (2013) defines startups as organizations formed to search for repeatable and scalable business models.

The study examines the concept of business opportunity through the lenses of entrepreneurship theory. In addition, in order for any entities, concepts, classes, limitations or attributes to be included, they have to be also included in relevant academic studies.

Based on this approach, a “business opportunity” is “identified” by an “entrepreneur” (in the present analysis this could be either an individual (actual person) or a legal person (a company)). The “business opportunity” refers to the development of a new “product proposition” (development of a new product or service, or an offer through a new business model, which means a new way to either offer value to customers or capture value for the company, or both), that address to a specific and well defined target group (a part of the total market) for which the product (or service or business model) is of greater value than any existing competitive product/service.

Further research Spyropoulos (2020) summarize several key factors related to business success and to entrepreneurs (or business founder’s), based on previous researchs such as: Gender, Age, Education, Number of Founders, Working Experience, Previous Entrepreneurial Ventures, Years of Start-Up operation, Reasons for Establishing the current Start-Up (Opportunity, Technology, Business Model Innovation and/or Process Innovation), Disruptive vs Sustaining innovation, the Competitive Advantage (Technology, Management, Intellectual Property, Business Model Innovation), and type of Innovation (An Improved Version of an existing Product, a distinctive New Product, a new Market Approach or an attempt to create a New Market). The concepts and role of Disruptive innovation is examined by Christensen (1997), Bowler & Christensen, (1999), Christensen & Overdroft, (2000)) and Roy (2019).

Spyropoulos (2018) also summarizes previous studies on entrepreneurial research. Muzyca (1999) clarifies that opportunities are about creating value, and not necessarily cutting costs, that opportunities are not the same for everyone and that not everyone pursues opportunities, even when they are obvious. Furthermore recent studies both (Marazol et al, 1999, Keane et al, 2018), exploring the different approaches between managers and entrepreneurs. “Previous research has examined the importance of various demographic variables such as personality, human capital and ethnic origin. Marital status, education levels, family size, employment status and experience, age, ethnicity, gender, socioeconomic status, religion and personality traits have all been considered to varying degrees. However, the picture which emerges from this research is somewhat “fuzzy” due to differences in testing procedures, sampling and country-specific factors.” (Marazol *et al.*, 1999, p.48). Research also indicates that entrepreneurs

focus more on timing than quantitative moves, use fewer moves focus on quality instead of more moves focusing on quantity and performance. (Katila et al, 2012).

Academic research offered managers and entrepreneurs a conclusive advice for success: “Innovate incrementally on proven technology through a continued R&D process”. This way the firm develops modifications for the basic product and process “without undertaking major basic research in areas unrelated to the original successful innovation” (Grosse & Kujava 1999, p. 509). However, such as advice was valid for sustaining innovation – disruptive innovation required a much different approach.

Aulet (2013) provides an integrated framework regarding the steps and key factors for successful entrepreneurship. Santisteban *et al.* (2017) provide a systematic literature review with a special focus on the various stages and the critical success factors Start-Ups, and summarize findings of previous academic literature, identifying as key success factors for start-ups, as following: experience, governmental support, capital, organizational age, and product innovation. Furthermore Cozzolino *et al.* (2018, p.42) emphasized on the availability of disruptive technological platforms as a prerequisite for disruptive innovation: “Disruptive technologies tend to come first and do not necessarily paralyze incumbents, but rather create opportunities”.

Amit *et al.*, (2012) examines the benefits of business model innovation, while further research concludes that: “The business model should be aligned with strategy, taking into account changes, in the external environment and with business processes to ensure continued successful management of people”. Further research compares Business models that address to the B2B market with Business models that address the B2C market (Stott *et al.*, 2016)**.** In addition (Juntunen *et al.*, (2018)) highlight the role of business model innovation with a special focus on IT solutions; in addition the same study links business model and business opportunity: “the scalability of the business model fundamentally stems from the synchronization of a business model to the respective business opportunity.”(Juntunen 2018 p. 33), while further research (Gregori *et al.*, (2019), Khodaei & Ortt, (2019) highlight the role of the business model in order to analyze changes within the entrepreneurial endeavor.

To determine whether a change in existing business model is necessary, Johnson et al. (2008) (as summarized by Eyring *et al*, 2011), suggest three steps: “Identify an important job a target customer needs done; blueprint a model that can accomplish that job profitably for a price the customer is willing to pay; and carefully implement and evolve the model by testing essential assumptions and adjusting as you learn.” (Eyring. *et al.* 2011, p. 90).

Academic research examines the role of Gender and its impact on Entrepreneurship; Mustapha *et al.* (2015) summarize previous academic literature regarding female entrepreneurs, while Kavoura *et al.* (2016), highlights cultural and gender issues in entrepreneurship.

Karamanos highlights the area of disruption and its effect in discontinuation of the existing technological framework. "A technological discontinuity can disrupt an existing technological regime and it has a profound effect on firms' economic activities and outcomes". (Karamanos 2016, p. 1)

Furthermore Roberts *et al.* (2015), examines the role of the founders, the importance of a team with complementary skills, as well as the role of integration of IT systems, resulting lower cost for developing new business opportunities (especially for IT companies). Roberts *et al.* conclude that reduced need for investment and lower risks were factors that offered entrepreneurs the opportunity to launch ventures with a lower budget and less capital requirements, from a younger age. The role of Intellectual Property is examined by Hormiga et al (2010), Aulet (2013) while further research (Usman *et al.*, 2017) examine the role of open innovation systems in order to establish effective collaboration between start-ups and the business ecosystem.

Further research examines Business Opportunities related to e-commerce applications in terms of marketing and ensuring accessibility such as electronic reservations and bookings, (Ferreira, 2018), actual purchases from local (and familiar) stores (Khurana, 2018) and applications of theory of Planned Behavior (Ziadat, 2015) in consumer choices. To this respect the concept of Business Opportunity can be linked with the concepts of accessibility (for users and customers) and with elements of consumer behavior (how, when, where, why consumers choose to purchase or consume a specific product).

In addition, Muzyca (1997, p. 28) defines entrepreneurship as "the ability to identify, pursue and capture the value from business opportunities''. He also defines opportunities as "something that exists on paper or as an idea" and identifies the following characteristics of opportunities:

1. Opportunities are about creating value, not necessary lowering cost.
2. Increase the customer's effectiveness and efficiency.
3. Complex opportunities break down.
4. Opportunity is not always (rarely?) found in well-documented growth markets.

Maroosis (2001) indicates that the "Business Opportunity" has the following attributes "provides certain benefits and potentials", "retrieves lost abilities". A new opportunity

may be possible at the point where opportunity reaches an end to its positive impact, however this principle may suit better to a search for a new opportunity (or to an evaluation of a potential opportunity) and as a result will not be included in the Ontology's analysis.

Based on the above, we can distinguish the concept of Business Opportunity as follows: "Business Opportunity" is defined as the development of a new product or service or a new business model which addresses a specific and well defined market segment.

Yadav (2015) reviews and summarizes a number of Entrepreneurship Models, highlighting the fact that the entrepreneurial success factors can be categorized as Individual and Environment Success Factors. Individual success factors have to do with personality, risk acceptance, willingness to start a business, planning and decision making (Rauch and Frese, 2000) Environment Success factors are determined by the business environment, and include factors such as access to finance, infrastructure, Human capital.

Yadav provides a list of key success factors, as listed in the models reviewed, and these are: Opportunity, Environment, Resources, Entrepreneur, Innovation, Management Skills, Organization, Personal Motivation, Ability and Motivation, Business Planning, Concept, Culture, Entrepreneurial Traits, Entrepreneurial Development, Finance Goals ,Human Capital, Industry Knowledge, Infrastructure, Network, People Skills, Personality, Skills and Project report, Strategies, Success of Enterprise, the Process, the Team and Willingness to Start Enterprise.

A list of factors (entities, relations and concepts) related to Business Opportunity are derived from the following Entrepreneurship Models and theoretical frameworks, and presented to Table 2 below.

More specifically, the Doblin Group (Keeley *et al*., 2013) introduced an integrated framework, The Ten Types of Innovation. Their model is presented in Table 3 below.

Ten Types of Innovation Model offers an integrated framework for innovation management; the value and popularity of this framework lays to the fact that it can be used easily in order to inspire innovators where they will focus their main effort; it is not advised to innovate in each possible way; as a rule of thumb, entrepreneurs are encouraged to focus on up to three types of innovation of the specific framework.

Aulet's framework provides a detailed methodology closely related with Business Opportunity, however it relates more to the Evaluation of the Business Opportunity and not on the Identification; as a result it will not be used to a large degree for the present ontology.

Table 2: Entrepreneurial Models & Frameworks.

Model	Author
Indian Model of Entrepreneurship	Zafar (1983)
Timmons Models of the Entrepreneurial Process	Timmons (1989)
General Model of Entrepreneurial Success	Rauch & Frese (2000)
Wickham model of Entrepreneurial Performance	Wickham (2001)
The Entrepreneurial Capital Model	Erikosom (2002)
Model of Entrepreneurial Process	Hisrich & Peters (2002)
The interactive model of Entrepreneurship	Morris et al (2005)
The conceptual Model of Entrepreneurial Success	Kumar (2007)
Rajput Model of Entrepreneurial Success	Rajput (2011)
10 Types of Innovation	Keeley et al, 2013, Doblin Group
Disciplined Entrepreneurship	Aulet (2013)

Table 3: Ten Types of Innovation Model.

Innovation Type	Key Characteristics & Comments
Profit Model	Refers to how the company makes money; as an approach it is in fact similar to Business Model Innovation
Network	Refers to key connections and partnerships that can be used to create value
Structure	Refers to the way skills and assets are used
Process	Refers to process innovation
Product Performance	Refers to product performance, which may follow or be against existing standards and performance criteria
Product System	set of complimentary products and services:
Service	Service, Support and overall customer experience
Channel	Refers to distribution, determines where (and sometimes how) consumers can actually purchase, take actual possession of the
Brand	Branding Strategy is actually a part of the marketing process
Customer Engagement	similar to customer journey concepts, but goes deeper; includes opportunities new technologies offer for customer engagement

5. ONTOLOGY DEVELOPMENT -- BUSINESS OPPORTUNITY TAXONOMY

Based on the literature review findings, the key entities, classes, and relationships related to “Business Opportunity” Ontology were identified and developed. Regarding

the methodology approach each concept or relationship related to “Business Opportunity” ontology (e.g. attributes, properties, entities, restrictions, classes) was required to be supported by related academic theory from related fields (business administration, economics and entrepreneurship).

To ensure suitable academic support, related literature findings are included in the following Table 4.

Table 4: Ontology: Business Opportunity (Entrepreneurial).

Classes	Sub-Classes	Restrictions	Attributes	Related References (indicated)
Opportunity (Entrepreneurial)		Creates value Lowers Cost Increase the customer's effectiveness and efficiency, provides certain benefits and potentials, retrieves lost abilities offers accessibility in a profitable way		Muzyca (1997), Also Deming's Principles, Maroosis (2001) Ziadat (2015)
Target Market	B2B market B2C market	Have access to market segment Market segment has a Specific need or a specific problem Market segment has available financial resources (can afford to buy our proposal)	Segmentation Criteria (Demographic (Age, Family Size, Family life Cycle,), Geographical (Climate, Population Density, Climate), Education, Religion, Race, Income, Gender, Occupation, Nationality, Social Class, Psychographic Lifestyle, Personality, Behavioral Occasions, Benefits , User Status, Usage Rate, Loyalty Status, Readiness Stage, Attitude	Aulet (2013) Blank (2013), Aaby et al, (1995) Rothberg (1981) Christensen et al (2000) Herschel & Nemati, 2000), Goyat (2011), Kotler (1994), Kotler et al, (2009) Kotler et al (2015)
Improved Product	Product Features Product Performance Product Quality Product Standards & Requirements	Cost Skills required (design and assemble)	Legislation Requirements	Aaby et al, (1995) Kotler (1994)
Business Model / (Profit Model)	Value Proposition Value Creation Value Capture content, structure, governance	valuable and unique	novelty, lock-in, complementarities and efficiency for simplicity will be considered part of the 10 types of innovations	Bashir et al, (2019), Sosna et al, (2010), Amit et al, 2012, Badden Fuller et al, (2010), Abrahamsson et al, (2019), Abrahamsson et al, (2019b) Chesbrough (2010), Gambardella et al, (2010), Zott et al (2010, 2011) (Keeley et al, 2013) Mezger (2014) Girotra et al (2014), Ramdami et al, (2019)
Drivers to resolve Problems	Idea, Passion or Technology	Related to a specific problem Idea and Passion define the problem and its causes Technology related to e-commerce and consumer trends	Technology enables the deployment of the solution Idea and passion envision possible solutions	Chessbrough and Teece, (1999) Cho & McLean (2009) Santisteban et al, (2017) Aulet (2013) Ferreira, (2018), Khurana, (2018) Ziadat, (2015)

TABLE 4: (Continued).

Classes	Sub-Classes	Restrictions	Attributes	Related References (indicated)
Entrepreneur (also as Founder in cases of Start-ups)	Person or Company	Male, Female, Legal Person,	Cultural Constrains, Education, Age, Working Experience, Business (entrepreneurial) experience, Reasons for Establishing the current Start-Up (Opportunity, Technology, Business Model Innovation and/or Process Innovation)	Mustapha et al (2015) Kavoura et al (2016) Spyropoulos (2020)
Intellectual Property	Patent Copyright		First to establish right Specific Period of years	Homiga et al (2010), Aulet (2013), Usman (2017)
Price	Related to the product level to serve the selected target market	Cost of Product and services to target market are less than the price		Aulet (2013) Mezger (2014) Ramdami et al, (2019)
Network (Business)	Strategic Partnerships and/or Value Chain		Part of the 10 types of innovation	(Keeley et al, 2013)
Structure	Skills and Assets available (compare with required)		Part of the 10 types of innovation (elements of swot analysis)	(Keeley et al, 2013)
Process (Customer Processes and include impact of environment)	Process Innovation		Part of the 10 types of innovation (elements of swot analysis)	(Keeley et al, 2013), Weaver (1996), Demming
Product Performance	Sustaining or Disruptive Innovation	existing standards and performance criteria for sustaining innovation, **or** against a new set of standards and performance criteria for disruptive innovation	Part of the 10 types of innovation	(Keeley et al, 2013)
Product System	Complimentary Products and Infrastructure		Part of the 10 types of innovation	(Keeley et al, 2013)
Service	Service, Support and Overall customer experience		Part of the 10 types of innovation	(Keeley et al, 2013)
Channel	where (and sometimes how) consumers can actually purchase, take actual possession and actually use your product		Part of the 10 types of innovation	(Keeley et al, 2013)
Brand		Branding Strategy is actually a part of the marketing process	Part of the 10 types of innovation	(Keeley et al, 2013)
Customer Engagement	Customer's ability to engage in product features, characteristics, delivery, availability, design, color		Part of the 10 types of innovation	(Keeley et al, 2013)

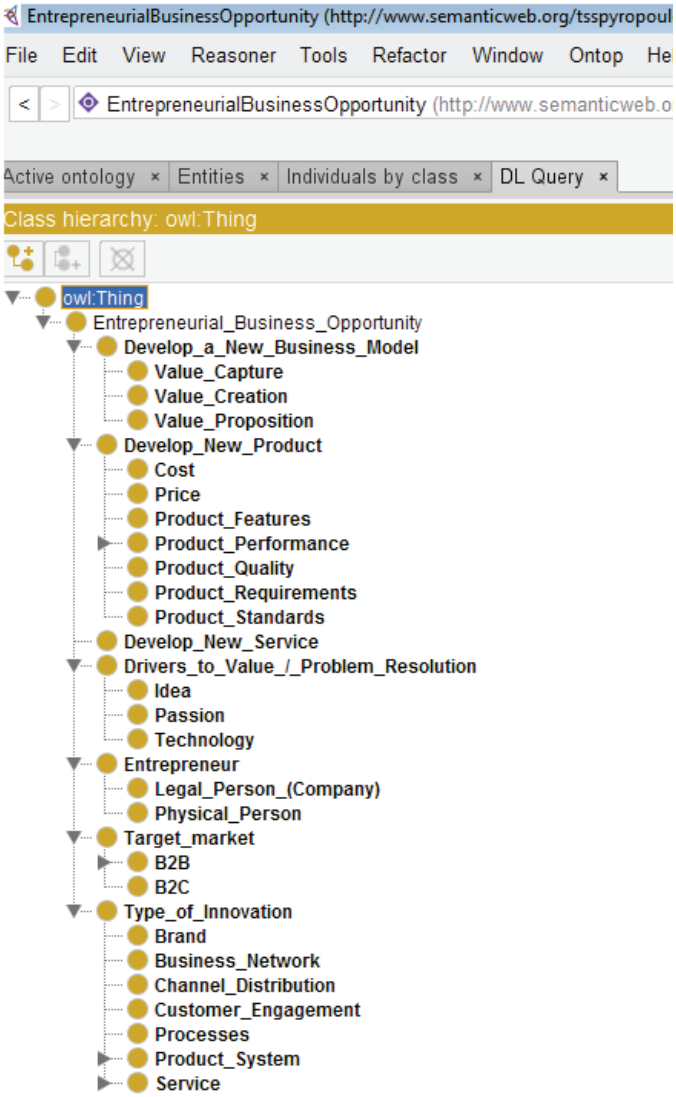

Figure 1: below is a screenshots from Protégé tool during the development of the Business Opportunity Classes.

6. VALUE OF THE RESEARCH

The study attempts to describe the concept of “Business Opportunity” as Ontology in order to describe a complex, real life and multidimensional concept and provide a clear understanding and ability to communicate the concept of business opportunity to people and machines (PCs).

Boer *et al.*, (p. 1246) suggest that regarding theory building and testing: “A good theoretical argument is linked to the data and builds on a small number of existing theories, preferably one or two, to make a coherent argument. The variables that are measured align with the relationships the theory predicts. Boundary conditions are clearly spelled out and there is a clear path from supporting or rejecting a hypothesis to

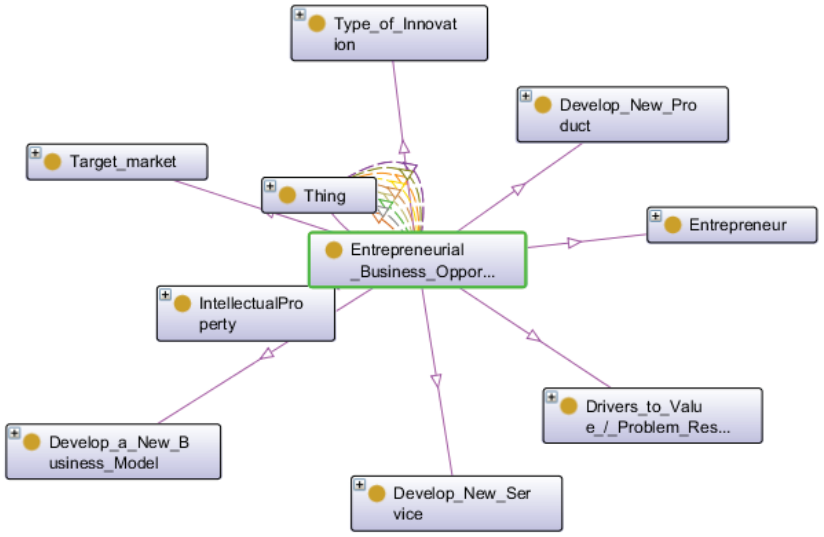

Figure 2: below offers a contained view of the Business Opportunity Ontology.

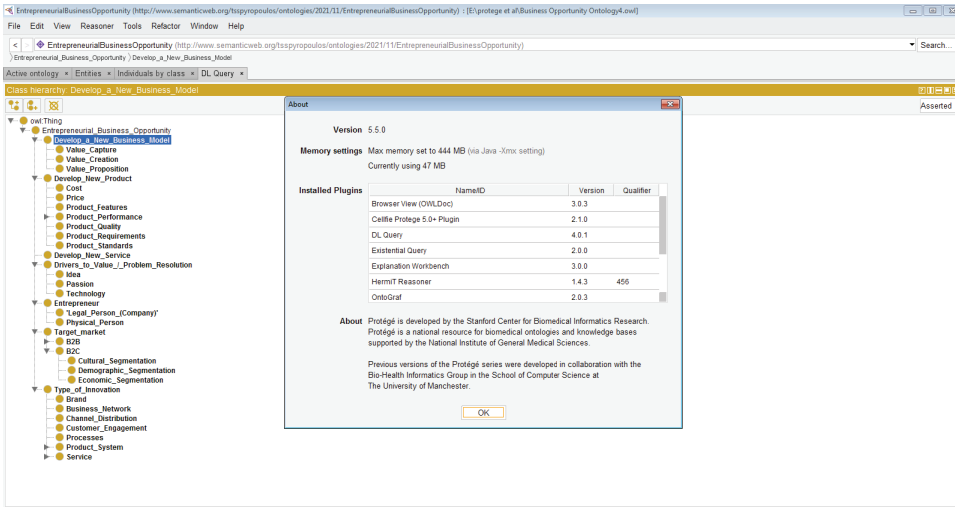

Figure 3: below is a screenshot from the Ontology Development on Protégé version 5.5.

the theory being used. Finally, a good theoretical argument makes it clear how results could be used to falsify as well as confirm."

In addition, past research regarding the original contribution to theory, with a special focus on Management Science, synthesizes previous studied and suggests that "Our synthesis reveals two dimensions—originality and utility—that currently dominate considerations of theoretical contribution". (Corley *et al.*, 2011, p. 13)

"The Academy of Management Review publishes distinguished original manuscripts which (a) move theoretical conceptualization forward in the field of management, and/or

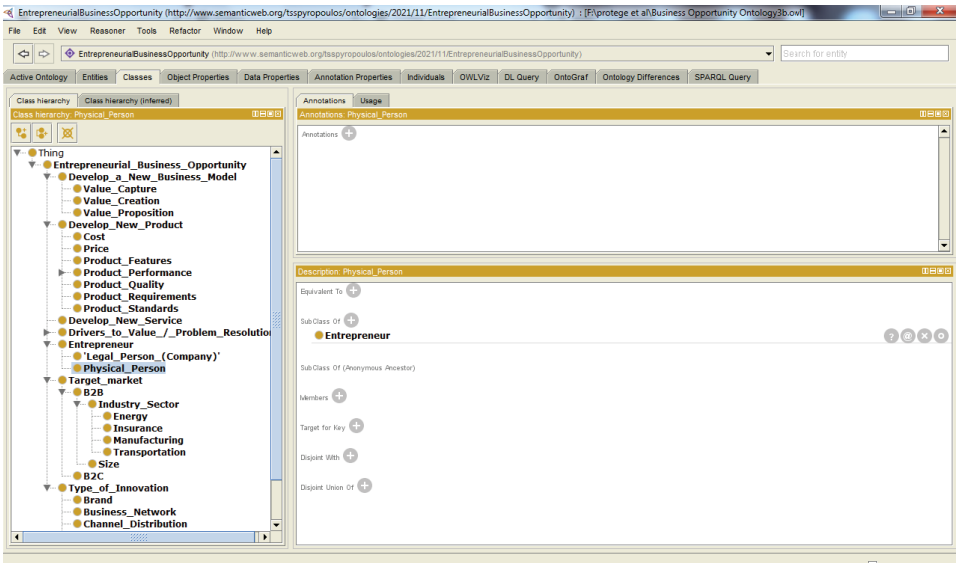

Figure 4: below is a Protégé screenshot during the Ontology Development, working on classes' hierarchy.

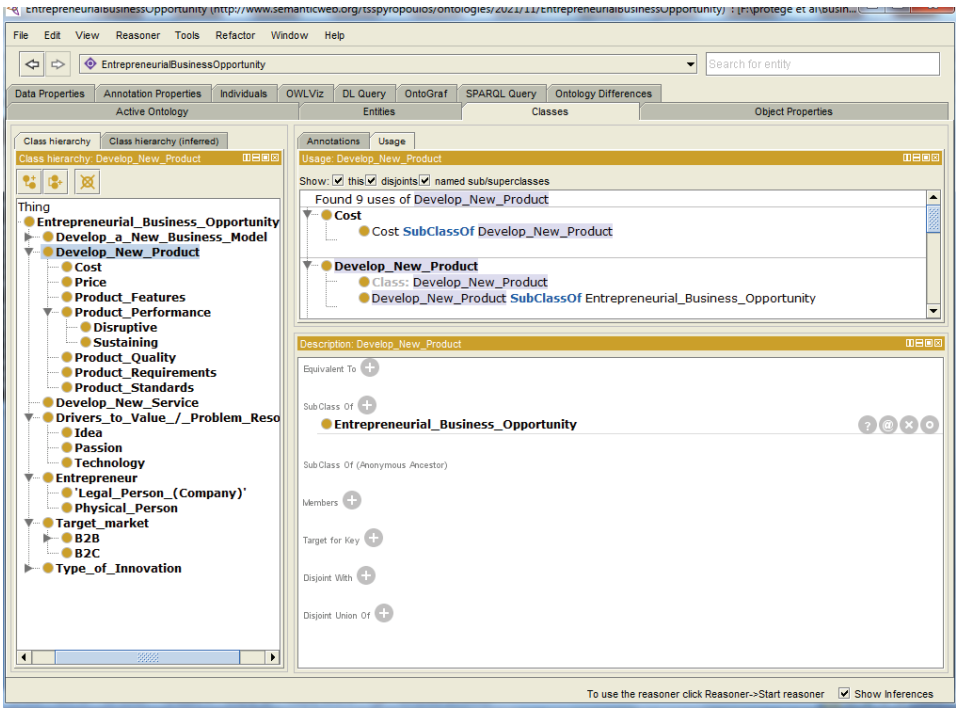

Figure 5: below is another Screenshots of Classes Hierarchy (Usage of Classes).

(b) indicate new theoretical linkages that have rich potential for theory and research in management, and (c) provide clear implications of theory for problem-solving in administrative and organizational situations." (Corley *et al.*, 2011, p. 13)

Considering the above criteria the study provides an original contribution to Entrepreneurship science, by creating the business opportunity ontology, based on relevant studies in multifactor complex phenomena, and therefore provides a new

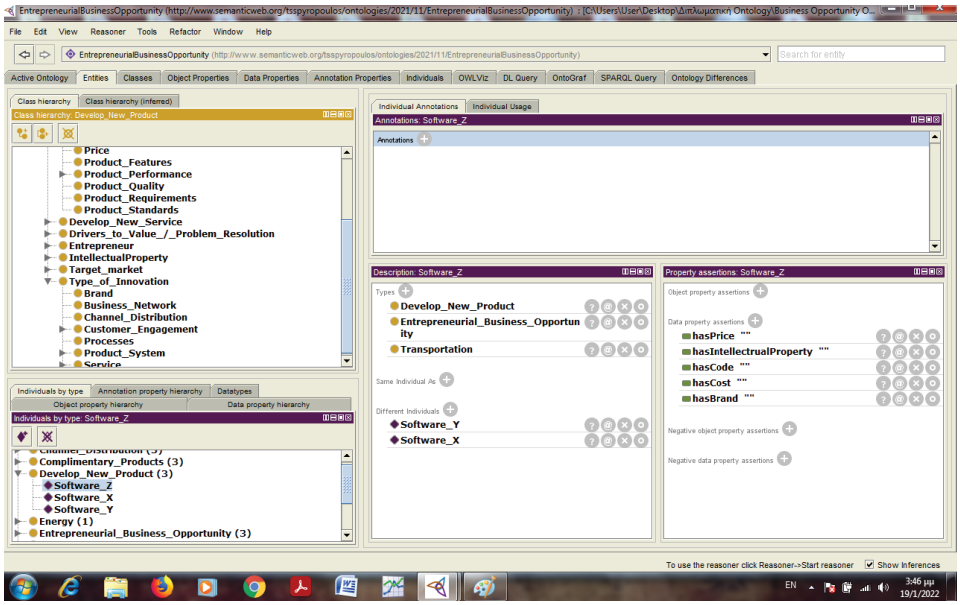

Figure 6: below is a screenshot of Product Analysis.

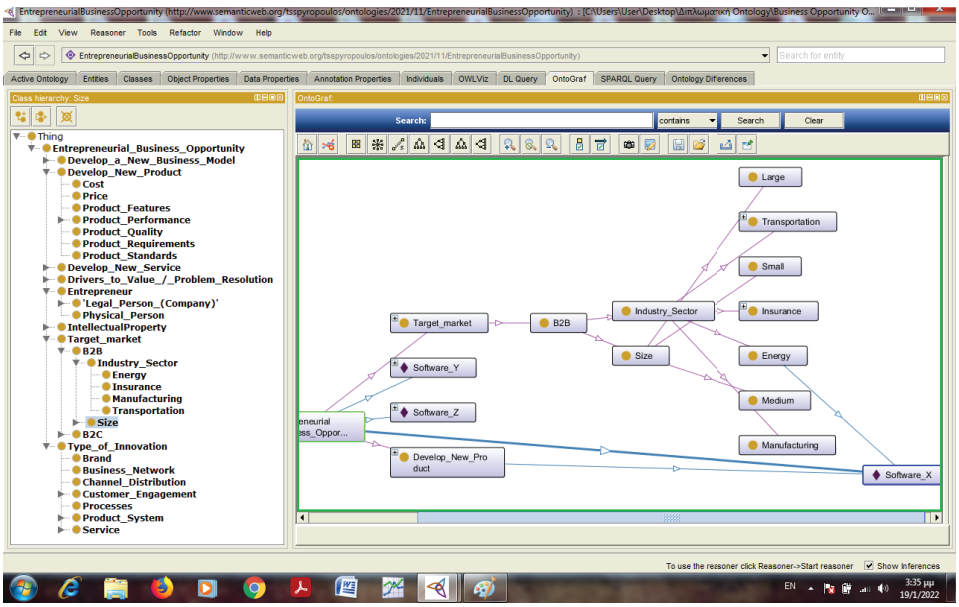

Figure 7: below is an example of Product Analysis.

approach in analyzing entrepreneurship enabling researchers to use the methodology suggested to develop a better understanding of entrepreneurship.

The study offers a well defined “business opportunity ontology” which can form the basis for a better understanding and sharing of the basic principles of the entrepreneurial and business theory regarding the definitions and conceptualization of business opportunity by highlighting the fact of the different criteria used among domains to define a business opportunity.

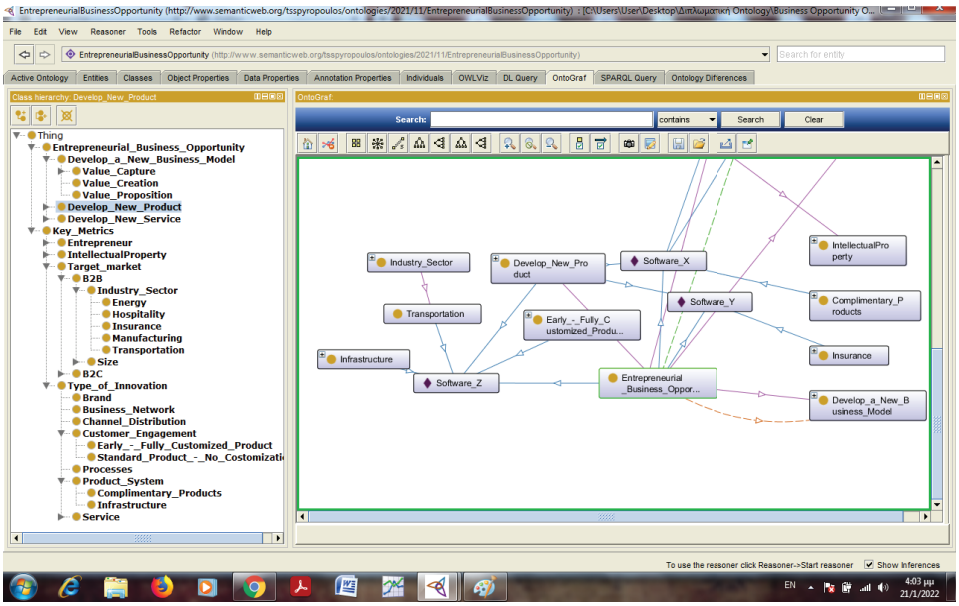

Figure 8: below provides an example of a specific product (Software X, Y, Z).

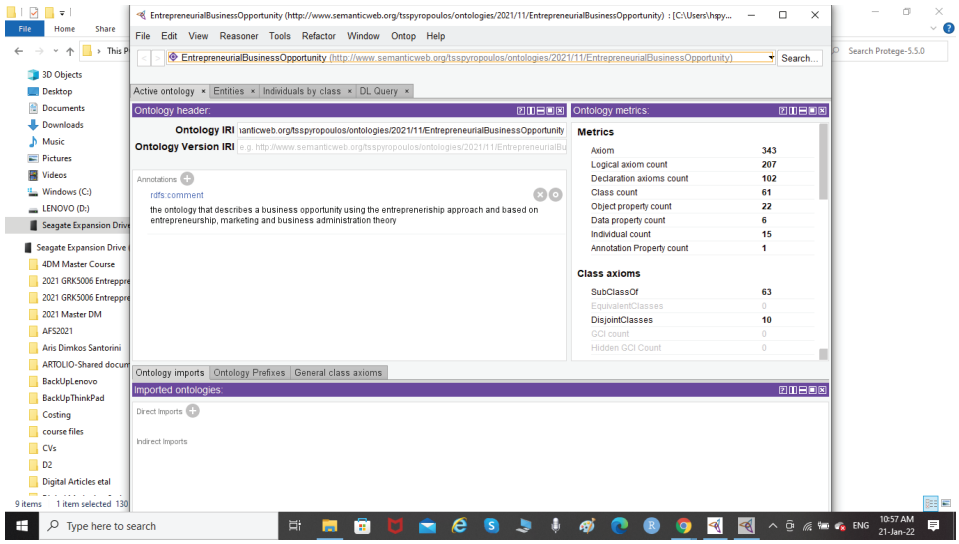

Figure 9: Below is an image of Metrics & Axioms .

7. LIMITATIONS AND FUTURE RESEARCH

The ontology is based upon the key concepts of entrepreneurial research and science; however entrepreneurship as a science keeps evolving and new types of entities may become critical factors for the entrepreneurial process in the future, and this may come from many and different directions (changes in legislative environment, new approaches to innovation management, changes in the business ecosystem) and further research can highlight new areas for studying the entrepreneurial process; as a result

the “business development” ontology will need to be further developed to include new related academic findings and perspectives.

Further research on the specific field is recommended to use a wider and updated list of research papers with the use of the proposed methodology in order to identify new entities and relationships related to the concept of Business Opportunity.

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