



TRANSPORTA UN SAKARU INSTITŪTS

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**AUTOMATIZĒTĀS VĒRTĪBU NOTEIKŠANAS METODOLOĢIJA UZ E-TEKSTU
ANALĪZES PAMATA GAISA TRANSPORTA NOZARĒ**

PROMOCIJAS DARBS

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Olga Zervina

**A METHODOLOGY OF AUTOMATED IDENTIFICATION OF VALUES IN THE AIR
TRANSPORTATION DOMAIN ON THE BASE OF E-TEXTS**

DOCTORAL THESIS

to obtain the scientific degree Doctor of Science in Engineering

Scientific area "Civil Engineering and Transport"
Scientific subarea "Telematics and Logistics"

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ANOTĀCIJA

Promocijas darbu "Automatizētās vērtību noteikšanas metodoloģija uz e-tekstu analīzes pamata gaisa transporta nozarē" izstrādājusi Olga Zervina, Dr.sc.admin, profesores Jūlijas Stukalinas, Dr.sc.ing., profesora Dmitrija Pavļuka un Dr. Nīla Rubensa vadībā.

Kā pētījuma objekts šajā darbā ir noteikts vērtību piedāvājums gaisa transporta jomā. Darbs ir vērsts uz datiem balstīta lēmumu atbalsta modeļa izstrādi, nosakot rīkus un procedūras, ko lēmumu pieņēmēji varētu izmantot, lai noteiktu jaunas vērtības kā daļu no vērtību piedāvājuma.

Prasība pēc jaunām vērtībām un vērtību skaita palielināšana gaisa transportā ir spilgti parādīta 2018. gadā Starptautiskās Gaisa transporta asociācijas (IATA) Rūpniecības lietu komitejas (IAC) ziņojumā "Future of the Airline Industry 2035". Dokumenta 12. ieteikumā ir skaidri norādīts, ka, "tā kā jaunās tehnoloģijas un vērtību maiņas maina cilvēku darba veidu un iemeslus, nozarei būs jāiegulda prasmēs nākotnes aviācijas vadītājiem un darbiniekiem un jāinformē par ieguvumiem, ko sniedz darbs šajā nozarē".

Arguments par plašāku aviācijas vērtību ir atspoguļots IATA Rūpniecības lietu komitejas ziņojumā kā lielo datu, automatizācijas un lietu interneta tendenču kombinācija. Paredzams, ka šīs izmaiņas radīs jaunas iespējas, mainot cilvēku un ierīču pārraudzību un mārketingu reāllaikā. Gaisa transporta uzņēmumiem ir izdevīgi saņemt atlīdzību par automatizācijas sasniegumiem, jauniem transporta veidiem un patērētāju attieksmi.

Šis pētījums atbalsta koncepciju, ka datu kontrolei par vērtību būs priekšrocības salīdzinājumā ar esošajiem konkurentiem jaunu nišu izstrādē. Pētījuma novitāte un mērķis ir mūsdienīgā metodoloģijā, kas ļauj teksta ieguves metodes kā daļu no dabiskās valodas apstrādes izmantot daudzās sākuma galvenajās lapās, lai savāktu datus kā automatizācijas procesa daļu. vērtību identificēšanai un paplašināšanai.

Vērtību noteikšana ir sarežģīta un sarežģīta problēma. Autors izmanto NLP pieeju, lai noteiktu šai problēmai piemērotas metodes un funkcijas. Tiek izmantota uz datiem balstīta tehnika, t.i., autors vispirms izveido datu kopu un pēc tam analizē to, izmantojot skaitļošanas lingvistiskās metodes, lai noteiktu, kuras funkcijas un metodes darbojas vislabāk. Autore izmanto arī korpuslingvistisko pieeju, t.i., uzticama valodas analīze ir vairāk iespējama ar korpusiem, kas savākti laukā tā dabiskajā kontekstā.

Promocijas darba galvenie rezultāti tiek prezentēti 14 starptautiskās zinātniskās konferencēs un publicēti 12 zinātniskos rakstos. Darbs sastāv no 5 nodaļām un ietver 194 lappuses, 39 attēlu, 24 tabulas pamattekstā, 14 pielikumus un 301 literatūras sarakstus.

ABSTRACT

The Thesis “A Methodology of Automated Identification of Values in the Air Transportation Domain on the Base of E-Texts” is written by Olga Zervina under the supervision of Dr.sc.admin, professor Yulia Stukalina, Dr.sc.ing., professor Dmitry Pavlyuk, and Dr. Neil Rubens.

As an object of research in this work, the value proposition in the air transport domain is determined. The work is focused on the development of a data-driven decision-support model, identifying the tools and procedures that decision-makers might use to determine new values as part of value proposition.

The requirement for new values and for increasing the number of values in Air Transport is vividly demonstrated in 2018 in the International Air Transport Association (IATA) Industry Affairs Committee (IAC) Report “Future of the Airline Industry 2035”. Recommendation 12 of the document clearly states that “as new technologies and value shifts change how and why people work, the industry will need to invest in skills for future aviation leaders and workers and communicate the benefits of working in the sector”.

The argument for the wider value of aviation is reflected in IATA’s Industry Affairs Committee Report as the combination of trends in Big Data, automation and internet of things. These changes are expected to lead to new opportunities, transforming how people and devices are monitored and marketed to in real-time. It is beneficial for air transport to take reward of advances in automation, new transport modes, and consumer attitudes.

This research supports the concept that controlling data on value will have an advantage over existing competitors in developing new niches. The novelty and aim of the research lies in the state-of-the-art methodology that allows text-mining techniques as part of Natural Language Processing to be applied to the numerous start-up landing pages.

Value Identification is a complex and difficult problem. The author uses an NLP approach to identify methods and features well suited for this problem. A data-driven technique is taken, i.e., the author first constructs the dataset and then analyzes it using computational linguistic methods to identify which features and methods perform the best. The author also takes the corpus linguistic approach, i.e., reliable language analysis is more feasible with corpora collected in the field in its natural context.

Main results of this thesis are presented at 14 international scientific conferences and published in 12 scientific papers. The thesis consists of 5 chapters and includes 194 pages, 39 figures, 24 tables in the main body, 14 appendixes and 301 references in the bibliography.

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List of Abbreviations

AAAL: American Association for Applied Linguistics
AI: Artificial Intelligence
ASAs: Air Services Agreements
AT: Air Transport, Air Transportation
ATVT: Air Transport Value Taxonomy
B.C.: Before Christ
BI: Business Intelligence
BM: Business Model
BMC: Business Model Canvas
BP: Business Process
BPS: Business Process Systems
CAA: Civil Aviation Authority
DSS: Decision Support Systems
ERP: Enterprise Resource Planning
FA: fitting-attitude
IAC: Industry Affairs Committee
IATA: International Air Transport Association
ICAO: International Civil Aviation Organization
IE: Information Extraction
IPO: initial public offering
IS: Information System
IT: Information Technologies
NER: Named Entity Recognition
NGO: non-governmental organizations
NLP: Natural Language Processing
OCT: Organizational contingency theory
POS: Part of Speech
PRICESG: Proficiency Requirements in Common English Study Group
STVA: Semantic Taxonomy of Values in Aviation
TT19: Transforming Transportation 2019
VER: Value Entity Recognition
VI: Value Identification
VP: Value Proposition
WTO: World Trade Organization
WVS: World Values Survey

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Definitions used in the Thesis

Air Transport - Air transport system consists of the components: airlines, airports, civil aviation authorities and air navigation services.

Value - something intrinsically valuable or desirable; a word or phrase indicating an element in the concept of value proposition.

Value proposition - a statement that clearly identifies what benefits a customer will receive by purchasing a particular product or service.

Value Entity Recognition (VER) - a Named Entity Recognition approach to Information Extraction Process where values are entities.

Text - the original words and form of a written or printed work (Merriam-Webster, 2022).

Landing page - in online marketing, a landing page is a single web page that appears in response to clicking on a search engine optimized search result, marketing promotion, marketing email or an online advertisement. A *Landing page* is used as an element of a broader term *webpage*.

Twitter profile - an introductory text in the Twitter social network, displaying specific information about a brand or business, including products and services; it usually contains a concentrated value proposition of a company.

INTRODUCTION

The relevance of the problem and the motivation of the research

Value creation is one of the primary goals of any business entity (Prasada et al, 2021). The strategy of a company starts with the developing its *value proposition* as (Lanning and Michaels, 1988) named a simple statement that summarizes why a customer would choose your product or service: *our affordable plane tickets, our comfortable business-class lounge*. If several people undertake to construct a company's value proposition, their results may differ in focus and subject matter. And the question is, which of these value propositions is correct? Perhaps they all do not reflect the values of the market? To find out, companies need to conduct costly and long-term marketing research that includes a fair amount of human error. To improve the situation, a more objective approach must be found, possibly with technical support, which is quite possible with the potential of the modern world (Ebel et al., 2016).

Automation of value identification would definitely lead to the extension of number of values. Moreover, Kaplan and Norton (2008) advise a company's strategy to be grounded "on a differentiated customer value proposition". Recent research shows the tremendous difference between the performance of companies depending on the number of values offered to the customers. When buyers assess a service or a product, they compare the perceived value of a product or a service to the price. (Almquist, Senior and Bloch, 2016) consider that for marketers, understanding and analyzing how customers think about the pricing side of the equation is a known and straightforward process. For strategic managers, understanding what consumers actually value and why they appreciate it, on the other hand, is far more difficult. Finally, business performance is improved for organizations that provide many components of value (Almquist, Senior and Bloch, 2016).

The capacity to recognize values at an early stage is critical for business performance. This research focuses on Air Transportation industry, which has recently experienced deep upheavals due to pandemic and geopolitical unrest leading to new values requirements. Report "Future of the Airline Industry 2035" (IATA, 2018). Recommendation 12 of the document clearly states that "as new technologies and value shifts change how and why people work, the industry will need to invest in skills for future aviation leaders and workers and communicate the benefits of working in the sector" Since some of the values that have previously received little attention, become dominant values, a concept known as value shift. Vivid examples include the automobile industry where vehicles are being transformed from valued high-powered into eco-friendly, electronics provide more usability features instead of pure

functionality, food industry focuses on wellbeing providing a value shift from highly nutritious products into organic and healthy nourishment. As new values become prominent, industries and their companies will be transformed; not following values could result in wasted resources (pursuing the wrong values) and becoming irrelevant (not pursuing the right ones).

The nature of value constantly depends on the viewer's perspective (Almquist, Cleghorn and Sherer, 2018). Competition is won by those companies who create the most diverse, unique, novel and demanded value proposition. Thus, businesses are faced with the challenge of identifying and expanding the value proposition.

To accomplish this task, companies use customer surveys and competitive analysis to define their value proposition. However, identifying values manually is a time-consuming task; and the number of obtained values is often limited.

In today's age of information technology and Big Data, it is imperative to employ these technology and massive amount of data in the process of developing a value proposition by companies. There exists data on values in companies' descriptions of their products on homepages, marketing materials and social network profiles. Major message indicating values is formulated by texts. Analysing these data using text mining techniques provides the opportunities for value identification and expansion (increasing the number of values). Automated value recognition tools can be regarded as a compelling additional challenge in the business context.

Scope, relevance, and novelty of the research

To explore the possibility of automatic value identification and expansion, this research narrows down the domain to the air transportation industry.

The requirement for new values and for increasing the number of values (from here on in this thesis *increasing the number of values* refers to as *value expansion*) in Air Transportation is vividly demonstrated in the International Air Transport Association (IATA) Industry Affairs Committee (IAC) Report “Future of the Airline Industry 2035” (IATA, 2018). Recommendation 12 of the document clearly states that “as new technologies and value shifts change how and why people work, the industry will need to invest in skills for future aviation leaders and workers and communicate the benefits of working in the sector”.

The argument for the wider value of aviation is reflected in IATA’s IAC Report (IATA, 2018) as the combination of trends in Big Data, automation and the internet of things. These changes are expected to lead to new opportunities, transforming how people and devices are monitored and marketed to in real-time. There is the benefit for air transport companies to take

reward of advances in automation, new transport modes, and consumer attitudes.

This research supports the concept that controlling data on value will have an advantage over existing competitors in developing new niches. As (Almquist, Senior and Bloch, 2016) proved, companies that scored high on four or more elements of value had recent revenue growth four times greater than that of companies with only one high score.

Companies attempt to develop their value proposition via comparison to rivals and conducting market research. To complete them manually, these procedures are labor-intensive and time-consuming. Automation has a distinct benefit in that it helps companies to detect more values while also suggesting new, unique, and previously unconsidered possibilities for businesses. Ayvari and Jirama (2015) examined three popular tools for building value propositions: Value Proposition Canvas by Osterwalder and Pigneur (2010), The Value Proposition Builder™ by Barnes and colleagues (2009), and People Value Canvas by Wildevuur and colleagues (2015). All of them are multi-stages tools involving market and customer analyses.

Thus, automation has a distinct benefit in that it assists companies in detecting more values while also suggesting new, unique, and previously unconsidered possibilities for businesses. In today's online age, companies mostly publish value proposition using their webpages including landing pages, online advertisements and social network profiles. Value proposition is delivered by means of text, visual and sound techniques. This research focuses on textual value proposition and employs NLP understand human language by analyzing text. Text mining is used to extract information from unstructured content.

The automation of value proposition in the research involves texts from landing pages and Twitter profiles of start-up companies in the air transport domain. Start-ups are chosen as a source of data of value as part of value proposition under the following criteria: start-ups are among the first companies to indicate new and unique values as their value proposition is based on a novel business model or innovation. Besides that, start-ups provide their information on novel value openly and willfully as one of the start-ups' goals is to continuously attract funding. The permanent process of search for funding reflects the nature of start-ups: constant growth aimed globally. To attract attention and offer convenient way to interact, start-ups provide information about themselves in the form of landing pages to unified databases, collecting thousands of start-ups. This research uses (Crunchbase, 2022).

The novelty of the research lies in the state-of-the-art methodology that allows text-mining techniques as part of Natural Language Processing (NLP) to be applied to the numerous start-ups landing pages to collect data as the part of automation process of value identification

and extension, detailing:

1. Novel task was proposed - value identification from texts, and a new Named Entity is introduced: Value Entity Recognition (VER).
2. Methodology for automation of value identification from texts with the goal to increase the number of values was developed.
3. Corpus/dataset of values in air transport was created.
4. Systematization of values: two value categorizations were developed in the form of taxonomies:
 - Air Transport Value Taxonomy, customer perspective.
 - Semantic Taxonomy of Values in Aviation, industry perspective.
5. A conceptual framework was built:
 - Value expression: one-word concept developed.
 - Social aspects of value: individual vs group values ratio concept developed.
 - Air transport value shift through history was identified.
 - Etymological genesis of the term value proposition developed.
 - Key factors influencing value proposition in aviation identified.

The main research question is: can values be identified and number of values be increased automatically?

The initial contribution of this research is the development of a data-driven decision-support methodology identifying the tools and procedures that decision-makers might use to determine values as part of value proposition. These tools and procedures are either articulated or developed by the author throughout the research. **Specific ideas** explored include a text annotation towards ambiguity of a task: inter-annotator agreement.

The approach. Value Identification (VI) is a complex and difficult problem. The author uses an NLP approach to identify methods and features well suited for this problem. A data-driven technique is taken, i.e., the author first constructs the dataset and then analyzes it using computational linguistic methods to identify which features and methods perform the best. The author also takes the corpus linguistic approach, i.e., reliable language analysis is more feasible with corpora collected in the field in its natural context.

The object, subject, aim, and tasks of the research

Object of the research is value proposition in the air transport domain.

Subject of the research is a methodology of a Natural Language Processing analysis

allowing to detect values as a part of value proposition.

The research aim is to develop a methodology for automatic identification and expansion of values in the domain of air transportation.

The research questions and research tasks are reflected in Table 1.

Table 1. Research questions and research tasks

Research Question	Research Task
1. How the notion of value is defined in literature?	To investigate literature on the philosophical ground and factual implication of value concept
2. Why does aviation industry require value expansion?	To explore aviation industry values
	To identify air transport industry specific factors that influence the development of values
3. Can values be identified manually?	To conduct an experiment annotating texts labelling values in the aviation context
4. Can values be categorized?	To develop value categorization in the form of taxonomies
5. Can number of values be identified and expanded automatically?	To discover additional values in comparison with the traditional number of values in aviation organization
	To create an automated methodology for value identification

Theses for Defense

1. Values can be identified from texts (landing pages, Twitter profiles)
2. Values in air transport domain can be categorized via taxonomies
3. A methodology allows to automatically identify values from textual information about the company

The methodology and methods of research

The author takes data-driven scientific methods. Table 2 offers a tabulated research methodology.

Specific tasks completed through the corresponding steps:

1. Theoretical analysis on values
 - 1.1. Literature review
 - 1.2. Conceptual framing
 - 1.3. Ending conditions determination
2. Approach: *Empirical to conceptual*

- 2.1 Values in texts of start-ups' landing pages
- 2.2 Semantic analysis: semantic categories
- 2.3 Relational, iterative process: categories are examined and arranged hierarchically into subclasses and then classes

2. Approach: *Conceptual to empirical*

- 2.4 Values in texts can be identified and expanded automatically
- 2.5 Neural network model trained on annotated texts
- 2.6 Dataset is constructed, and accuracy is calculated

3. Ending conditions met

- 3.1 Values expressed by words are identified under annotators' agreement
- 3.2 Values are categorized
- 3.3 An automated model created
- 3.4 A methodology for automatic identification of values developed

Table 2. Tabulated research methodology

<p>1. Theoretical analysis on values, conceptual framing and determining ending conditions</p> <ul style="list-style-type: none"> 1.1. Secondary data analysis: review of theoretical literature, previous research, policy documents 1.2. Framing: evaluation and conceptualization of approaches and notions 1.3. Ending conditions: values expressed by words are identified, expanded and categorized, annotators' agreement achieved, a methodology for automatic identification of values developed 	
<p>2. Approach</p>	
<p><i>Empirical to conceptual</i></p>	<p><i>Conceptual to empirical</i></p>
<ul style="list-style-type: none"> 2.1 Values in texts of start-ups' landing pages identified 2.2 Semantic analysis: semantic categories detected 2.3 Relational, iterative process: categories are examined and arranged hierarchically into subclasses and then classes 	<ul style="list-style-type: none"> 2.4 Assumption: values in texts can be identified and expanded automatically 2.5 A model trained on annotated texts 2.6 Dataset is constructed and accuracy is calculated
<p>3. Ending conditions met</p>	
<ul style="list-style-type: none"> 3.1 Values expressed by words are identified under inter-annotators' agreement 3.2 Values are categorized 3.3 An automated model created 3.4 A methodology for automatic identification of values developed 	

Thesis composition. This Thesis consists of an Introduction, five Chapters, Concluding section and 14 appendixes.

The following methods have been used in work: the system approach, conceptualization, information extraction, exploratory experimentation, the methods of statistical analysis, methods of quality analysis, surveys, pattern identification, building a

model.

Theoretical contribution

This research provides the novel concept of a possibility for automated value identification and expansion which leads to the potential categorization.

This research is the first to conduct a task of automated value identification and expansion. It provides the theoretical framework of automated value identification and expansion that can be applied to any domain.

The research explains which factors should be considered in automated identification and expansion of values as part of value proposition: notion of value, inter-annotator agreement, one-word approach in the classification, classifier's accuracy.

Finally, the provided categorizations of values in the form of taxonomies contributed into the following: a common language for sharing concepts, knowledge discovery (patterns, trends), allowing for reuse of information rather than recreation, match items or contents sharing the same concepts, provide metadata for identification, comparison, analysis.

Empirical contribution

This research constitutes the first study considering quantitative characteristics of values as a part of value proposition as the primary field of investigation. Additionally, this study uses a novel approach for taking texts of start-up companies as a research base for identifying and expanding values. This broadens the existing techniques on developing value proposition of a company. Moreover, the obtained data show that values can be significantly expanded and categorized to support the decision-making process. Through this, it was identified that deep learning tools can be utilized to automate the process of value identification and expansion.

The possibility of values' extension in numbers and their hierarchal categorization enables the consideration of a much wider range of more common mechanisms of value analysis such as market research and comparative analysis of competitors. This is important as novel value developing activities can be difficult to align with traditional company activities and require substantial effort and an additional skillset to accomplish.

Finally, the information gained on the operations of the extensive number of start-up companies provide insight into novel tasks in air transport as start-ups are among the first to provide innovations. Further application of the offered methodology could provide a comparative base to refine this understanding and expand the data set.

Practical importance and application

1. Strategic decision-making scope is widened by providing extended choice of values based on innovations and novel business models.
2. Taxonomies allow elaborating common language for new concepts; provide consistent data for identification, comparison, and analysis.
3. Automation provides opportunities for identification industry value shift through time and new values can be documented using time- and resource-saving technique.
4. Novel methodology has a potential applied to different domains enabling identification and extending values beyond air transport.

Context of Terms

1. ***Air Transport (AT)*** domain is assumed throughout the thesis (unless stated otherwise). Air transport system consists of the components: airlines, airports, civil aviation authorities and air navigation services (IATA Air Transport Fundamentals course, 2022). The term ***Air Transport*** is not unified by regulating authorities. Number of sources including IATA use the term ***Air Transportation*** and ***Aviation*** as a synonymic phrase to ***Air Transport***. Examples: “Learn about the history of ***aviation***, its different components and interdependencies among: airlines, airports, civil aviation authorities and air navigation services” (IATA Air Transport Fundamentals course, 2022); “Study how the ***air transportation*** system relates to airlines, airports, civil aviation authorities and air navigation services” (IATA Air Transport Fundamentals course, 2022). Therefore, this thesis utilizes terms *air transportation*, *air transport* and *aviation* as synonyms.
2. ***Values*** are assumed to be a part of the value proposition concept
3. ***Texts*** are texts in landing pages - web pages, created specifically for a marketing purpose.

Final Result

The aim of the research was accomplished, and the resulted Methodology for Automatic Value Identification from AT Texts was developed. It includes 5 steps: Exploratory Data Analysis, Data Source Identification, Text Annotation, Data Systematization, and Modelling (see Figure 38).

Structure of the Research Process

The research is structured as follows (Figure 1): the problem of the research is formulated in the form of review of previous works on the topic, identification of the object

of research, the aim of the study and research questions. The solution to the research problem is based on the formulation of tasks leading to answers to research questions. Theoretical and empirical solutions are presented. Results are offered to each research question. The final result is the achievement of the aim of the research.

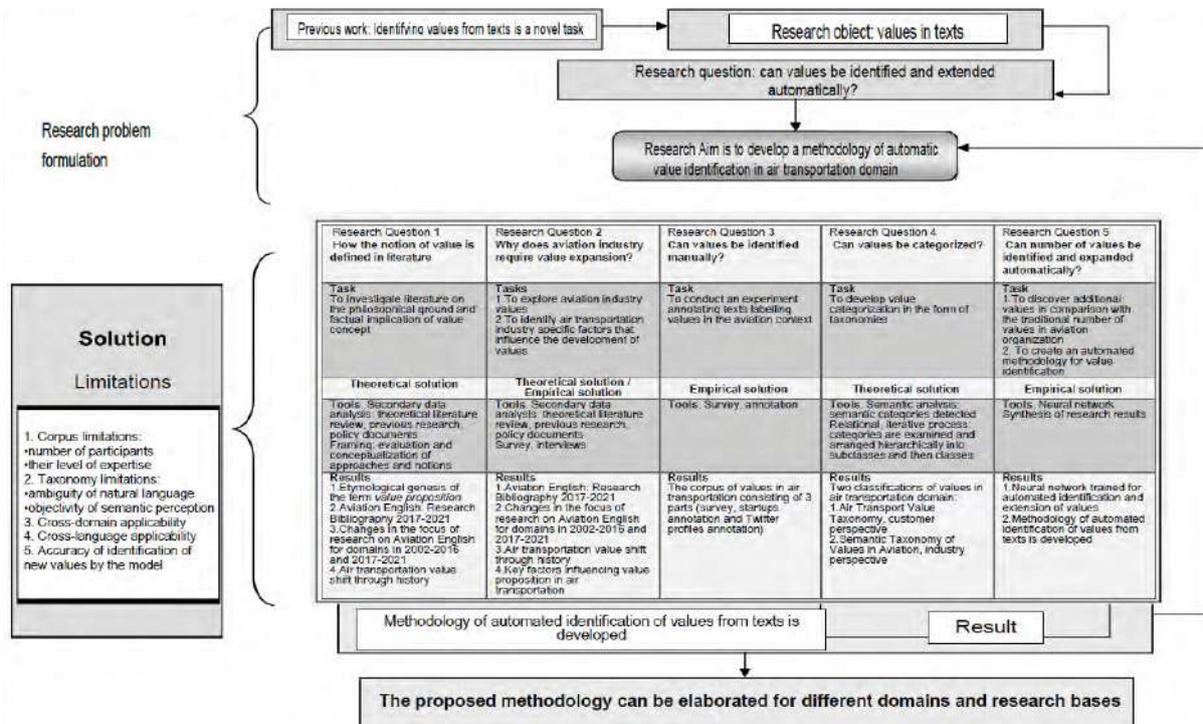


Figure 1. Structure of the research process (adopted from I.Kabashkin, Lectures for Scientific Seminar, 2019)

Thesis Structure

The work consists of the Introduction, 5 chapters, the Conclusion, and 14 appendices. It contains 194 pages, 39 figures and 24 tables. The list of references and information sources contains 300 titles.

The Introduction presents the motivation of the research, the aim, tasks, the object and the subject, the novelty, the empirical and theoretical contribution of the research, as well as its structure.

The first chapter describes the development of aviation strategic management as air transport is taking as a case study in this research and the concept of Value Proposition and values as part of this concept. Values and value proposition in this context are the object of this study. The data source for this research is online texts of start-up companies, their benefits as a source of data are discussed in this chapter.

The second chapter discusses data-driven decision making and decision-support systems, the benefits of making decisions based on data and provides methodological background of the research. The potentials of information extraction methods for supporting

business processes are presented. Narrowing the methods of information extraction to named entity recognition and binary classification approaches as some of the main applied methods of text mining of this study is presented. Value Entity Recognition is offered as a resulting combined method.

The third chapter describes the procedure of the experiment, taxonomies development principles and a novel one-word approach to the value identification by annotators and classifiers.

The fourth chapter presents key findings and response to the research questions: conceptual analysis, the corpus of values, hierarchical classifications of values, possibility to automate value identification and expansion process by developing natural language processing model.

The fifth chapter offers empirical and theoretical contribution of the Thesis and discussion on value analysis and practical importance of the results.

Limitations of the research

The following limitations applied to this research:

1. Corpus limitations:
 - demography of participants,
 - their level of expertise.
2. Taxonomy limitations:
 - ambiguity of natural language,
 - objectivity of semantic perception.
3. Vague boundaries of domain-associated products and services.
4. Cross-domain applicability.
5. Cross-language applicability.
6. Accuracy of identification of new values by the model.

Interdisciplinarity

Increasing prominence continues to be given to interdisciplinary collaboration as a fundamental means of addressing challenges within academia, industry and government (Frodeman, Klein and Pacheco, 2017). In particular, there is a growing call for interdisciplinary research to respond to complex, ‘real-world’ problems, and help produce ‘responsible’ research. The Interdisciplinarity of value identification and expansion task is presented in Figure 2.

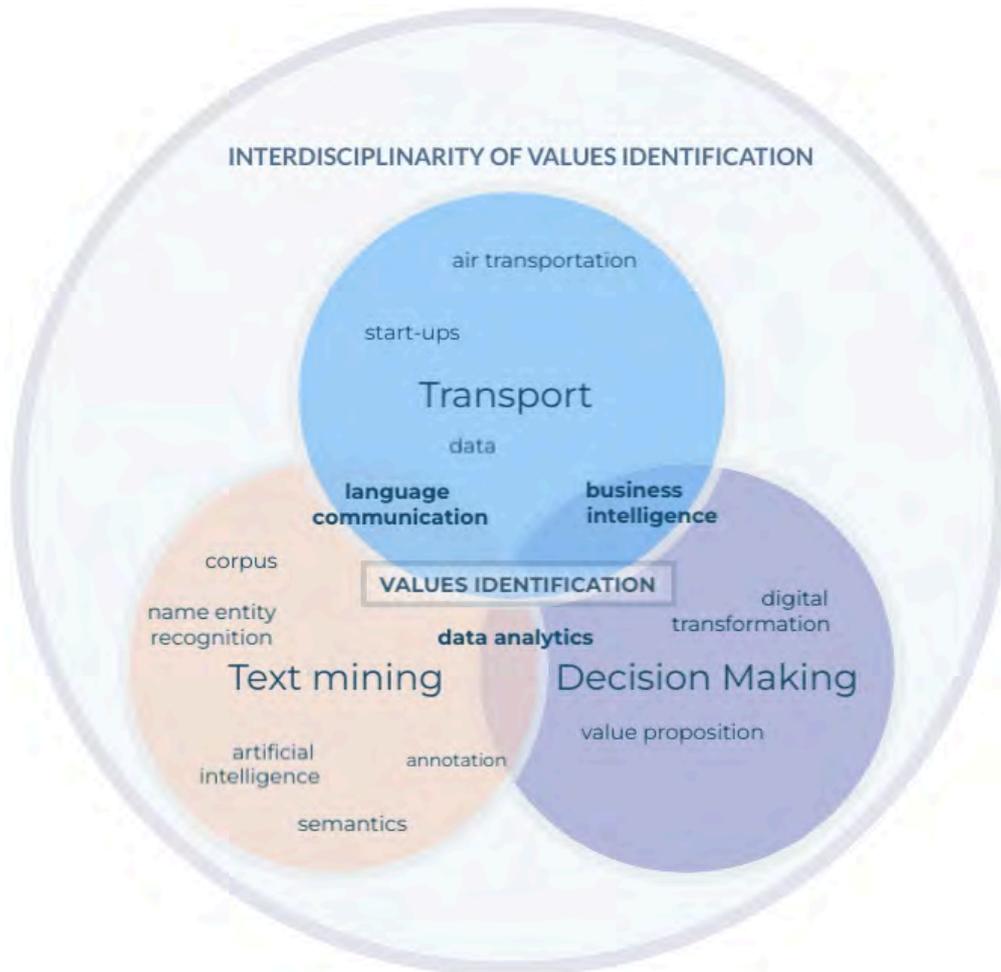


Figure 2. Interdisciplinarity of values identification (by author)

This research adopts the concept of interdisciplinarity from the definition formulated by Nick Monk (2022) from The Institute of Advanced Teaching and Learning: Interdisciplinarity is the combining of methods and insights of two or more academic disciplines into the pursuit of a common task, such as a research project. This is defined by the crossing of “traditional boundaries” across academic fields or schools of thoughts addressing new and developing concerns.

In this thesis, the interdisciplinary approach manifests in the application of text mining engineering techniques to theoretical knowledge of the value proposition to support data-driven decision making. To narrow a research base, air transport domain was chosen as a case study.

The interdisciplinary approach to the identification of values in texts, the strategy of which is aimed at obtaining new synthetic knowledge about the ways of extracting values, unlocks great prospects for conducting comparative scientific research.

The work approbation

The basic concepts and findings were reported and discussed at scientific conferences

and seminars. The author has 12 publications on the subject of the thesis and 23 conferences, workshops and real-life business-processes.

The results of the research were published in the following **journals and proceedings**:

1. Zervina O., 2022. *Value Expansion and Sense Making*. BHMK-D-22-00023R1. Behaviormetrika, Japan ISSN: 1349-6964, DOI: 10.1007/s41237-022-00179-7 (Scopus)
2. Zervina, O. and Stukalina, Y., 2022. *Determining Value Proposition In The Context Of Aviation Industry Strategic Management*. Scientific Programme Committee, p.270. The 14th International Scientific Conference “New Challenges in Economic and Business Development - 2022: Responsible Growth”: Riga, Latvia, May 13, 2022. Proceedings. Riga: University of Latvia, 2022, 275 p (in process Web of Science, EBSCO)
3. Zervina, O., 2021. *The environment of extremist textual content threatening transportation systems*. In International Conference TRANSBALTICA: Transportation Science and Technology (pp. 541-551). Springer, Cham. DOI: 10.1007/978-3-030-38666-5_57 (WoS)
4. Zervina, O., Stukalina, Y., Pavlyuk, D. and Rubens, N., 2021, October. *One-Word Approach in Text-Mining for Value Identification*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 135-143). Springer, Cham. DOI: 10.1007/978-3-030-96196-1_13 (Scopus)
5. Neil Rubens, Olga Zervina, Yulia Stukalina, 2020. *Air Transport Value Taxonomy*. 15th International Forum on Knowledge Asset Dynamics (IFKAD 2020) - 09-11 Sep 2020, University of Basilicata, Italy, pp. 178-194. ISBN: 978-88-96687-13-0 (Web of Science)
6. Zervina, O., Stukalina, Y., Pavlyuk, D. and Rubens, N., 2020, October. *Value creation in air transportation: beyond price, quality, and speed*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 119-129). Springer, Cham. DOI: 10.1007/978-3-030-68476-1_11 (Scopus)
7. Zervina O., Rubens N., 2020. *Air Transport Value Proposition*. COVID-19 Affect. XXIII Annual International Professional Conference, Sting Academy, 2020, BRNO, Czechia ISSN 1805-6873 EBSCO, (ERIH PLUS)
8. Zervina O., 2020. *A Linguistic Analysis of Startups in The Context of the Air Transport Industry Management*. 14th Baltic DB&IS, June 16-19, 2020, Tallinn, Estonia. <http://ceur-ws.org/Vol-2620/> pp.57-64
9. Zervina, O., 2019. *The Analysis of Threat Defining Language in the EU Official Transport Security and Safety Documents*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 329-338). Springer, Cham. DOI: 10.1007/978-3-

030-44610-9_33 (Scopus)

10. Zervina O. and Stukalina Y., 2022. *Factors Influencing Value Proposition in the Aviation Industry in the Context of Customer-Centric Digital Economy*. RelStat-2022, TSI, Riga, Latvia (accepted for conference presenting and publishing)
11. Zervina O. and Stukalina Y., 2022. *Using AI for scaling up a business in the age of digital transformation*. RelStat-2022, TSI, Riga, Latvia (accepted for conference and publishing)
12. Zervina O., Stukalina Y., and Pavlyuk D., 2022. *Value Entity Recognition Task in the Air Transportation on the Base of E-Texts Analysis*. RelStat-2022, TSI, Riga, Latvia (accepted for conference presenting and publishing)

The main results of the research were approbated at the following **conferences, workshops, and real-life business-processes:**

1. Zervina, O. and Stukalina, Y., 2022. *Determining Value Proposition In The Context Of Aviation Industry Strategic Management*. Scientific Programme Committee, p.270. The 14th International Scientific Conference “New Challenges in Economic and Business Development - 2022: Responsible Growth”: Riga, Latvia, May 13, 2022. Proceedings. Riga: University of Latvia, 2022, 275 p (in process Web of Science, EBSCO)
2. COST Action, 2022. Nr. CA19102 - “*Language in the Human-Machine Era*” – a trainee. LITHME 2nd Training School, Porto, June, 2022.
3. Zervina O., 2022. *Implementing a Neural Network for Decision-Making in The Aviation Industry*, July 2022. 8th International Scientific Symposium "Economics, Business & Finance", IRIS-Alkona, Latvia.
4. Zervina O., 2021. “*Automation of Values Identification and Extension*, “Managing the Dynamics of Platforms and Ecosystems Session”, 54th Hawaii International Conference on System Sciences HICSS 2021, January 7, 2021. Hawaii, USA
5. Zervina O., Value Identification as One of the Main Prerequisites of Business Success and Sustainability. 7th Virtual International Scientific Symposium "Economics, Business & Finance", Latvia. Iris Symposium, Latvia, 2021 <https://irissymposium.wixsite.com/economics/abstract>
6. Zervina O., 2021. *Value Proposition in the Field of Aviation Transportation*. 7th Virtual International Scientific Symposium "Economics, Business & Finance", Latvia. Iris Symposium, Latvia, 2021 <https://irissymposium.wixsite.com/economics/abstract>
7. Cost Action, 2021. “*European network for Web-centered linguistic data science*” [COST Action CA18209]. WG1 - Linked data-based language resources workshops.

8. Zervina, O., Stukalina, Y., Pavlyuk, D. and Rubens, N., 2021, October. *One-Word Approach in Text-Mining for Value Identification*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 135-143). Springer, Cham. DOI: 10.1007/978-3-030-96196-1_13 (Scopus)
9. Neil Rubens , Olga Zervina, Yulia Stukalina, 2020. *Air Transport Value Taxonomy*. 15th International Forum on Knowledge Asset Dynamics (IFKAD 2020) - 09-11 Sep 2020, University of Basilicata in Matera, Italy. pp. 178-194. ISBN: 978-88-96687-13-0 (Web of Science) <https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/en/covidwho-1529507>
10. Zervina, O., Stukalina, Y., Pavlyuk, D. and Rubens, N., 2020, October. *Value creation in air transportation: beyond price, quality, and speed*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 119-129). Springer, Cham. DOI: 10.1007/978-3-030-68476-1_11 (Scopus)
11. Zervina O., 2020. *Expanding Value Proposition in the Field of Aviation Transportation*. 6th Virtual International Scientific Symposium "Economics, Business & Finance, Latvia 9 - 10 July 2020. <https://irissymposium.wixsite.com/economics/abstract>
12. Neil Rubens, Olga Zervina, 2020. "Data availability. Data as a Resource", conference report. Boiling Point. Data Debates. October 21, 2020. Tomsk, Russia. <https://obzor.city/news/656881---v-tochke-kipenija---tomsk-projdut-data-debaty>
13. Neil Rubens, Olga Zervina, 2020. *Talk on Artificial Intelligence: Innovations*. H&M Group The Laboratory, Stockholm, Sweden. 23 November, 2020
14. Zervina O. and Stukalina Y., 2020. *Education and Training in Engineering: Developing a Marketing Strategy for a Higher Education Institution in the Agenda of Customer-Driven Education*. Proceedings of special session in Young Researchers' Seminars in the 18th RelStat Conference, Riga, Latvia. https://alliance-project.eu/wp-content/uploads/2016/03/ALLIANCE_D3.8_final.pdf
15. Zervina O., 2020. *A Linguistic Analysis of Startups in The Context of the Air Transport Industry Management*. 14th Baltic DB&IS, June 16-19, 2020, Tallinn, Estonia. <http://ceur-ws.org/Vol-2620/> pp.57-64
16. Zervina, O., 2019. *The Analysis of Threat Defining Language in the EU Official Transport Security and Safety Documents*. In International Conference on Reliability and Statistics in Transportation and Communication (pp. 329-338). Springer, Cham. DOI: 10.1007/978-3-030-44610-9_33 (Scopus)

17. Zervina O., 2019. *The Place of Unstructured Text Data in Transportation Security*. Published at: Karapetjana, I., 2019. Language for International communication: Linking Interdisciplinary Perspectives on Cultural, Professional and Scientific Capacity Building: Book of Abstracts: 4th International Symposium, LINCS, Latvijas Universitate, April 11-12, 2019 Riga, Latvia. ISBN 978-9934-18-419-2
18. Zervina O., 2019. *Cyber-Security Trends And Issues In Global Trade*. 5th International Scientific Symposium “Economics, Business & Finance” Iris Symposium, Latvia
19. Cost Action, 2019. “*NexusLinguarum - European network for Web-centered linguistic data science*”. CA18209. Workshop.
20. SmartLynx Airlines, 2020. Online platform for check-in and shopping. Air Transport Value Taxonomy was adopted by the developers’ team (Annx XI).
21. Zervina O. and Stukalina Y., 2022. *Factors Influencing Value Proposition in the Aviation Industry in the Context of Customer-Centric Digital Economy*. RelStat-2022, TSI, Riga, Latvia (accepted for conference presenting and publishing)
22. Zervina O. and Stukalina Y., 2022. *Using AI for scaling up a business in the age of digital transformation*. RelStat-2022, TSI, Riga, Latvia (accepted for conference and publishing)
23. Zervina O., Stukalina Y., and Pavlyuk D., 2022. *Value Entity Recognition Task in the Air Transportation on the Base of E-Texts Analysis*. RelStat-2022, TSI, Riga, Latvia (accepted for conference and publishing)

1 VALUES AS PART OF VALUE PROPOSITION IN AIR TRANSPORTATION

This chapter highlights several studies pertaining to air transport strategic management, its challenges and characteristics and presents a detailed aviation strategic planning exploration, which involves a notion of strategy, a formulation of strategy and challenges. This study, with a precise emphasis on sustainable development in air transport, briefly introduces the theories of strategic management adopted in the aviation industry. Furthermore, important aspects for comprehension of the deepness of strategic planning of air transport are explored, including a sustainable development in aviation strategic management and institutional framework; stakeholders in aviation and their engagement into aviation sustainability are

examined; challenges and issues of the air transport industry which are addressed while implementing the sustainable development have been studied.

1.1 Value Proposition

This subchapter explores the nature of value proposition, its historical background and modern implication.

As many experts agree on the idea that creating value is a goal for every company, the identification of value becomes important for company's strategic management. Aviation industry explores a limited number of values, because it is relatively monopolist; it is expensive to implement new values in aviation: it is a very high regulated field. Commercialization initiates competition and new value proposition search.

An example of new values successfully introduced in aviation: business low cost, JetBlue, 2016, Finnair will fly exclusive direct flights between these two start-up capitals networking on board. KLM launches Meet & Seat (KLM, 2012).

The general concept of value, of what is good and bad, instrumental value or contributive value categories are introduced in 1.1.1 Notion of value section. Further, in 1.1.3 Value relations and hierarchy, the idea of value compatibility and hierarchy is discussed - if one can measure values, weight them or make a hierarchy. The history of value proposition in air transportation, its specifics and aviation value shift are observed in sections 1.1.5, 1.1.6 and 1.1.7. Economic characteristics, for instance overcapacities, confrontational trade unions, unstable fuel prices, that can influence value proposition, are examined in section 1.1.7. Also, 1.1.5 proves the need for new value identification and constates the absence of the relevant research. Finally, the ambiguity of the term "value" and its specific usage in this thesis is presented in the last section "Ambiguity of value", 1.1.5.

1.1.1 Notion of value

Classical taxonomies assist in categorizing reality into fundamental types—whether plant kinds or atom types; examples are Mendeleev's periodic table of elements or Linnaeus' categorization of plants. However, (Rabinowicz and Rønnow-Rasmussen, 2016) claim that a taxonomy of values is not thought to be about existing or even realistic entities. What matters is not what is true, in many instances, but what is thought to be true.

The World Values Survey (EVS/WVS, 2021) and the European Values Study (EVS/WVS, 2021) are the examples of empirical studies which aim to explore people's beliefs on what is a value for them whether it is explicit or implicit opinion investigating people's

preferences. The main focus of the studies of this kind is the effort to provide data for sociologists and politicians about what people like, what they consider to be important, what are their views and their preferences about specifically their lives and general beliefs. While those studies are very interesting for many purposes, this dissertation concentrates on a narrower issue of the same kind: the aim is to identify values specific for one industry - air transportation.

A value taxonomy distinguishes amongst different kinds of objects which are considered to possess value. (Rabinowicz and Rønnow-Rasmussen, 2016) believe it is used to identify three types of applicable views on values starting back to (Parfit, 1984). Two among those three belong to monistic types of values: Hedonism is identifying whatever is good in general or “good-for” and pleasure over pain creates a positive balance; whereas theories of desire (examples involve Aristotle's *De Anima* (Hicks, 2015) and *Passions of the Soul* by René Descartes (Descartes, 1989)) associate values with the desires satisfaction. The third type of applicable theories stands clearly pluralistic: (Parfit, 1984) called it as an “objective list view, which ascribes value to a variety of different types of things (e.g. to friendship, love, freedom, etc)”.

This dissertation deals with some concepts of values in air transportation domain that can be explained by the following neutral examples, which are provided by (Rabinowicz and Rønnow-Rasmussen, 2016):

- “(1) Pleasure is good and pain is bad; mentions a positive and a negative general value
- (2) Drugs are not good for you; refers to a relational value, “good-for”
- (3) This painting by Titian is beautiful; is about an aesthetic value
- (4) Rescuing a boy is a brave act; mentions a specific value property
- (5) Salieri was a superior composer comparing to Mozart; states a value relation
- (6) John is a good philosopher; as opposite to the ‘predicative’ use in the statements as (1)”, this provides an illustration of the ‘attributive’ usage of values predicate.

This following explanation of attributive and predicative practices is given by (Rabinowicz and Rønnow-Rasmussen, 2016): “in the attributive usage, ‘good’ is a category modifier (“a good philosopher”, “a good knife”, etc), but to use as a predicative, it is self-sufficient. At times, the plain grammar makes it unclear how a word was planned to be understood. Contrast “x_is_a_grey_building” with (6). In contrast to a preceding statement, (6) is not able to be interpreted conjunctively: This x_is_a_grey_building denotes it to be a building and x is grey. So, in this context “grey” was utilized predicatively. Though the phrase

“John is a good philosopher” cannot require John to be good. “Good” there attributes “a philosopher”, it is not self-sufficient”.

The perspective that statement as (1)-(6) constitutes an evaluative claim is founded in the broad collection of notions about in what way those judgements vary from (purely) descriptive assertions like ‘joy is a state of mind; ‘some individuals may be drug addicts’; and ‘this picture weighs 6 kilos’. However, value assertions need to be separated out of what are known as deontic assertions, such as "You should honour your commitments" or "We must rescue her." Though evaluative and deontic statements are compared to descriptive statements, here is a sense of action-guidingness and 'prescriptivity' in the deontic which cannot be found in the evaluative, at least overtly. It is debatable if the latter contains an implied prescriptive character. According to the so-called fitting-attitude analysis of value - FA analysis (Rabinowicz and Rønnow-Rasmussen, 2004), which has garnered much attention recently, an object is valued only if it is fitting (suitable, warranted, required, etc.) for favoring. Whereas "favor" forms a placeholder for the pro-attitude, the term "fitting" refers to the analysis's normative component. As a result of this approach, value judgements might be seen as implicitly prescriptive.

The above listing of value assertions could also be used to illustrate specific concerns in value theory that value taxonomies are relevant to. 'Good' and 'bad' appear as completely distinct predicates from, example, 'courageous' or 'beautiful'. To assess something as excellent provides far less (if any) detailed information on the object than it would if someone evaluated it to be lovely or someone to be courageous. Due to their lack of descriptive information, the terms 'good' and 'bad' have been dubbed thin ideas; more detailed value conceptions, on the other hand, have been dubbed thick ideas (Williams 1985). A point of discussion is the nature of difference between dense and sparse evaluative notions.

Geach (1956) established the essential point that the predicative use of the term "excellent" is meaningless in comparison to its attributional usage. According to this interpretation, as (Rabinowicz and Rønnow-Rasmussen, 2016) consider, the obvious predicative usage of the form "a is good" is an incomplete expression that requires completion by specifying the category to which the item is intended to belong and within which it is deemed a typical example. Accordingly, "John is good" is a brief idea of "John is a nice person”, possibly "a nice man", "The Eiffel Tower is magnificent" serves as a short idea to "The Eiffel Tower is a magnificent structure or “majestic tower”, etc.

The concepts of instrumental and auxiliary value are somewhat challenging. For

instance, it is not self-evident that a means to an end is a justifiable end in and of itself. (Moore, 1903; Lewis, 1946; Ronnow-Rasmussen, 2002). Indeed, FA analysis enables the distinction between basic values and true instrumental value: instrumental value is assigned to an entity when and exclusively when its usage as a means to an end is suitable. In comparison, the definition of final value FA states that an object gets final value if and only if it is suitable for it to favor it for its own reason.

(Olson, 2005) gave the following definition of instrumental values: "An instrumentally valuable object owes its value to the ultimate value of what it is for." But derived values do not exclude finite values, as seen in the example of the diamond ring. The final cost (in this case, the inner one) of the ring is determined by the cost of its stone. Sentimental values can also be defined in a similar way. Ronnow-Rasmussen (2011) offers an example of such values by describing an engraved donation - an inscription made on an inexpensive ring - but it is this inscription that makes the ring valuable in the eyes of its owner.

But some concepts of good or bad are not expressed by attributive words. It is enough to name the subject to induce the attitude. One of the examples is the innovations that address concept of human flight.

Human flight has always been positioned as a dream, as the goal of progress, as a symbol of freedom. Therefore, when describing technologies that allow human flight, the need to convince of the value of human flight, to describe human flight as something good, necessary, valuable, and important disappears. The connotation of the term "human flight" is already positive due to the traditional view of human civilization on the possibility of flying.

A similar attitude can be observed among survey respondents if they are asked about values. The answers will be descriptive words like "good, cheap", as well as listing the desired objects or actions: video games on the plane, disinfection, lunch (Zervina et al, 2020). From this it can be concluded that the intuitive connotation of many entities is of value to the majority. This is something that marketers and copywriters need to consider when promoting products. Though, (Geach, 1956) claims some categories like "state of affairs", "event", "thing", etc. to be "too general to play the role of category-fillers in value statements: they do not provide standards that allow us to identify their exemplary representatives", the real-life usage of connotations makes marketers to estimate the comprehension of consumers, not the research.

Thus, values in studies are ordered into domains such as monistic and pluralistic, attributive and predictive, thick and thin, pleasure, economic, prudential, aesthetic, moral,

instrumental - mentioning some frequently encountered. This dissertation makes no conceptual distinctions of the domains of value air transport industry is interested in. But to categorize values on the basis on philosophical concepts could be a beneficial way in exploring deeper customer preferences. This Thesis differentiates between semantic context of values in modern English and applies to a value as a part of value proposition defined first by (Lanning and Michaels, 1988) as “a clear, simple statement of the benefits, both tangible and intangible, that the company will provide, along with the approximate price it will charge each customer segment for those benefits”.

1.1.2 Value shift

Recent changes in value shift from entertainment to social responsibility, and from consumerism to eco-friendliness turn researchers back to the discussion of people as rational agents. Aviation is a highly technological industry, so a recent value shift from the exploitation of the environment to its protection has affected aviation as well. Developing the company's strategy in this industry, managers take into account changes in consumer perception of values.

(Rabinowicz and Rønnow-Rasmussen, 2016) concluded a deep research on good-for-individual and good-for-all people's rationality: when acting as rational agents, people have a choice between doing what (people believe) is good for them and doing what (people believe) is good per se, i.e., what is impersonally good or what is good in general (Methods of Ethics, 1874, 1981 ed., Henry Sidgwick). Choosing the best option becomes a serious challenge when doing so does not result in the agent getting the best outcome. Among the insights that Sidgwick believes to distinguish ancient Greece ethics from today's ethics is the idea that reasonable approach should select between assuring the presence of impersonally good (moral considerations) and secure one receives “good for you” (securing one's personal interest) (Crisp, 2004). Greek philosophers, in this approach, failed to properly address the perception of this idea because they understood what was good as the good outcome for the actor. As a result, it failed to grasp the concept of “dualism of practical reason,” which refers to the presence of two separate general goals for which people tend to make those goals to serve one another. Whether or not Sidgwick is correct about assertions, regarding antique Greek philosophers (Brewer, 2009) criticizes this matter and considers it to be controversial. It is undeniable for contemporary ethics to turn that difference around. Sidgwick's response to the dualism problem was somewhat different from (Moore's, 1903) reaction in his key book *Principia Ethica*, although both were radical in their own ways. "My own good," Moore

claimed, was a non-sequitur when it refers to the form of positiveness of value property, some personal goodness, which is somewhat in the user's property (as Moore thought egoism presumed): "What is meant by "my own good," then?" he wondered. According to Moore, the entire concept of someone's good was incoherent if it linked to some type of amoral or immoral behavior: "What could possibly be advantageous to me in any way at this point?" It becomes evident when people take a step back and assume as (Moore, 1903) defines: "The only thing that can belong to me, that can be mine, is something good, rather than the fact that anything is good in and of itself". A position in modern value theory evolved in the aftermath of Moore's dispute, which reduced what is good-for to what is excellent in general terms (what is good period). To describe such a reductionist point of view, Moorean monism is commonly utilized.

Michael Smith serves as an example of the idea that "commonsense morality seems to tell us that our obligations are a function of the relative weights of both the neutral and the relative values at stake in a particular choice situation" (Smith, 2003), which is stated by (Rabinowicz and Rønnow-Rasmussen, 2016). In contrast, though some good is viewed neutrally, as Moore posits, some others could be relatives, Smith contends that the two value forms are incommensurate, and so common-sense morality is not consistent with its belief that it could weighed in any way. Smith, on the other hand, explores another version of practical moral, under which here "is only one kind of goodness—there is only subscribed [i.e., relational] goodness—and the distinction between neutral and relative goods is made by distinguishing between the properties in virtue of which things are good". This viewpoint may be characterized to be the form of "good for" monism, nonetheless only if someone reads Smith's "subscribed goodness" as "goodness for", and it is not an apparent interpretation. The other notion of subscribed goodness could be goodness-in-relation-to.

This dissertation does not distinguish between "good for me" and "good for all" values in its approach to value taxonomy construction. But some value categories, which are defined as results of value proposition analysis in air transportation, bear signs of "good for me", e.g., entertainment. And some other categories can be described as "good for all" values, e.g., ecology.

1.1.3 Value relations and hierarchy

This section is dedicated to the concept of values relation. It is an issue that has only recently gotten significant consideration in the media. As a result, there is a limited amount of literature on the subject, and many of the contributions are highly technical in nature. It can

be stated that two objects are commensurate if one is superior to the other, inferior to the other, or is equal to the other: neither better nor worse. As Ruth Chang has pointed out in several papers, two objects may be comparable in terms of their relative worth, even if they are incompatible in the meaning described before. Instead of being connected in one of the traditional ways, they may be considered on a parity, this is how she expresses this idea (Chang, 1997, 2002, and 2005); considering, for example, Da Vinci (x) and Beethoven (y): they are compatible in terms of artistic brilliance, but instinctively, none of them is superior than the other in terms of talent.

That way, y and x cannot be considered as equal-good; also, none is worse than the other one. That they nevertheless are comparable in value is something Chang (2002a) tries to establish by “the Unidimensional Chaining Argument”. Take for example the object z which is poorer than either of y and x and still is of the same type as, for example, x. Consider the following scenario: z is a composer, similar to Beethoven (y), though of a different caliber. Thinking about basic succession of things: start with z and continue to y, consider how each subsequent item in one aspect is somewhat better than its neighbor competitor, while standing equally good in all the rest of aspects. As one progresses through the sequence, the respects in which advances are achieved may differ. However, it is supposed that each move of the sequence has a little change in only one aspect. Theoretically, a modest ‘unidimensional’ enhancement cannot have an impact on comparability: it cannot transform the object which is similar to x into an item that cannot be considered as compatible with x. Since the first element in the sequence is comparable with x (by hypothesis, y₀ is worse than x), the same should therefore apply—by induction—to each element that follows, up to and including the last element, y.

Chang admits that the argument for parity as a fourth type of value comparability remains incomplete until it is shown, as she indeed tries to do (Chang, 2002b), that parity phenomena cannot be explained away as instances of vagueness, or perhaps as mere gaps in the evaluative knowledge.

When it is presumed that there is equality in the value relation, how could such a value relation be reviewed? Joshua Gert (2004) offers clarity in this with the use of FA-analysis, as follows: he suggested comparing values as formal, subject to certain norms, objects. In this case, one object becomes more needed, better or more important than another, only if it is required by the standards. Accordingly, both objects are equally good if the difference between them is not important in this case. Parity for values can be called a situation in which objects

are evaluated according to several aspects or criteria. And then the preferences will depend on how exactly the value of the aspects is weighed. The parity of values in such a situation will differ depending on the acceptable methods of assessment. Parity can be seen as a kind of comparison of values. But what if the values are incomparable?

The following recommendation is made by Rabinowicz (2008): indifferences and preferences are two types of preferred attitudes that are distinct from one another: The ability to be neutral between two objects refers to the ability to be equally capable of making either decision. However, for certain pairings of things, it may not have a clear preference for one over the other. One generally feels the decision scenario as inwardly conflicted when faced with a difficult option in such a situation. Arguments can be seen on each side, but one is unable (or unwilling) to balance them out. Alternatively, one may vacillate without having a firm position. A decision is made if someone is forced to do so, but do not settle the conflict of arguments that exist. One can tolerate incompatibilities in the FA-analytic approach because the absence of a set preferred attitude allows to accommodate them. To put it another way, when lack of preferred attitudes toward the couple of objects is realised, these objects might be both incomparably different. In other words, y and x to be incompatible under the only condition when it is unacceptable favouring one over another or to be neutral to either of them.

Carlson (2010) provides an alternative parity study that is not reliant to FA-analysis and can be thus more accurate. Using the concept of betterness, Carlson defines parity as follows: two objects are on an equal footing if neither of them is better than another one nor alike excellent, and suitable betterness relationships to another objects of their respective domains can be observed. This concept, on the other hand, is only conceivable if the domain of objects is sufficiently diverse. Otherwise, it is possible that there are two objects that are incomparably different on the surface, but that are equivalent when compared to the definition under examination.

This dissertation provides relative assessment of values by number of times each value has been mentioned.

1.1.4 Modern approach to value proposition

The World Values Survey (EVS/WVS, 2021), a global project for value exploring, claims that values “have over the years demonstrated that people’s beliefs play a key role in economic development”. Value proposition could be seen as beliefs reflected by entrepreneurship.

New values are being adopted by companies to increase their profitability and resilience. According to (Almquist, Senior and Bloch, 2016) in his elements of value study, success of companies is driven by ability to deliver on multiple Elements of Value. In their research, Almquist et al give examples of the number of values for the world leading smartphone brands: for example, LG delivers 3 elements, Samsung 10 and Apple 12); a company that delivers good performance on bigger number of elements than other market players can be attracting more customers and can charge higher price than competitors do. Examples: Red Bull - the company sponsors extreme sports connecting sports enthusiasts worldwide), Nordstrom (the company acquired Trunk Club giving sense of affiliation and belonging).

Though (Lanning and Michaels, 1988) first used the expression “value proposition” (VP) in a 1988 work document for the consulting company “McKinsey and Co”, (Almquist, Senior and Bloch, 2016) suggested an original strategy based on a differentiated customer value proposition. A suggested set of value was called Elements of Value. Elements of Value (Figure 3) where categories are based on the classic Maslow’s Hierarchy of Needs (Maslow, 1943).

Maslow’s Hierarchy of Needs (Maslow, 1943) so far has been serving as a basic for evaluation of human nature and human requirements for the well-being. For the first time, (Almquist, Senior and Bloch, 2016) have adopted this hierarchy of human needs to the hierarchy of the values that are expected from business by customers. This idea serves as a brilliant example of cooperation between business and science.

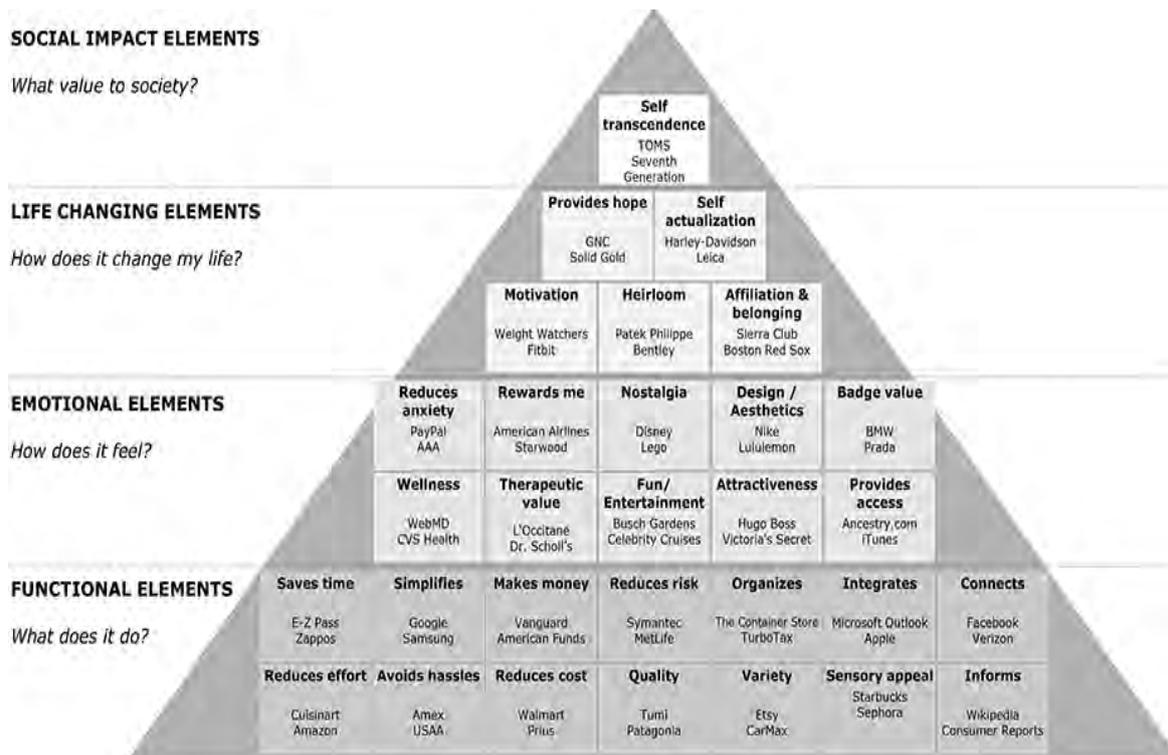


Figure 3. Heuristic model of value with examples of companies exhibiting elements of value (Almquist, Senior and Bloch, 2016)

There is comparatively few research on analyzing value propositions in online start-ups. (Su-C Li, 2007) argues that a properly constructed value proposition is essential to the value creation process in e-business, and value co-production is the building blocks for value protection mechanism in network economy.

(Äyväri and Jyrämä, 2017) in their article “Rethinking value proposition tools for living labs provide a conceptual analysis on value proposition tools to be used in future empirical research and in building managerial insight. Three managerial methods for developing value propositions are examined in the context of the conceptual analysis, which is based on living labs frameworks and current theoretical advances surrounding the notion of value. Among findings in the context of the living labs approach, the Value Proposition Builder seems to conflict with the ideas and premises of user-centric innovation processes (Äyväri and Jyrämä, 2017).

(Guo, Hai, Jun Yang, and Jiaping, 2019) examined the fit between value proposition innovation and technological innovation (exploitative vs explorative) for the performance of start-ups in the digital environment. They based their research on on-site survey data of 285 digital start-ups in one of the world's largest digital economies and found that explorative innovation strengthens the positive impact of value proposition innovation on the performance of start-ups, but exploitative innovation weakens this positive effect (Guo, Hai, Jun Yang, and

Jiaping, 2019).

Introducing new values is one of the main tasks for today's successful company. The numerous problems that aviation businesses confront necessitate the search for innovative approaches to achieving values creation, market share and profitability. In this context, innovations in business models can be closely linked to a new perspective for the company (Pereira et al, 2021).

Introducing new value proposition demonstrates its relevance and to prove it, Casadesus-Masanell and Ricart (2010) claim that companies are competing differently when they innovate in their business model. Achtenhagen et al. (2013) also argue that changes in the business model are essential for success, because they create value, opportunities and reduce the risk of inaction when a company stays with the same model that has been successful so far.

With airlines, the pioneering use of new business models based on new values enables the sustainability advantage of anticipation, named First-Mover Advance (FMA), proposed by Markides and Sosa (2013). The implementation of a successful business model can position an airline in front of the competition with a well-defined model that allows adding value from innovations performed (Markides and Sosa, 2013, Teece, 2010).

Examples of new value introduction can be found in the struggle of airlines with Covid-19: on board passengers are allowed with a doctor's note of negative test or a vaccination certificate only. Claimed value is health safety in these examples.

Among values that are expected from the air transportation industry, there are some that are not expressed in any vivid way in open-questioned surveys, but they appear in the discussions if asked directly: passengers trust aviation in terms of following industry regulations (see Appx VI).

1.1.5 Ambiguity of value notion

Value, as a theoretical concept, seems to be both ambiguous and vague, as the term itself can be viewed from many different perspectives (Erikshammar, Björnfort and Gardelli, 2010).

Even though the term "value" is widely used, both researchers and industry experts claim a lack of pure comprehension of it and ineffective application. The Customer Value Proposition concept which is based on a general meaning of the term "value" remains poorly defined (Ballantyne et al. 2011; Skálén et al. 2015), and Lanning (2003) claims that "unfortunately, the term value proposition ... is frequently tossed about casually and applied

in a trivial fashion” than “in a much more strategic, rigorous and actionable manner”.

With time frame back to 70 years till 1980ies, Table 3, adopted from (Payne et al, 2017), reviews the Proposition Concept development, preceding the development of the Value Proposition Concept.

Table 3. Development of the Proposition Concept

Term	Explanation	Source
Early use of the concept of a proposition in advertising: 1910s–1930s	Starch (1914) argues that the presentation of a proposition is the essence of advertising and emphasizes how this activity should aim to get customers to act on the proposition. Hopkins (1923) notes that consumers become committed to a brand and that advertising plays an important role in responding to a new proposition.	Starch 1914; Hopkins 1923
Unique selling proposition (USP) and basic selling proposition (BSP): 1940s–1960s	A USP (Reeves 1961) comprises the functional unique benefit that is highly relevant to consumers and that differentiates it from competitors. Emphasis is on the basis for rational consumer behavior, rather than emotional influences. Early correspondence from Ogilvy (1947) to Reeves suggests that Reeves may have been influenced by Ogilvie’s concept of the BSP, which he argued is the “heart and guts of every ad.”	Ogilvy 1947; Reeves 1961
Emotional selling proposition (ESP):1970s–1980s	There are few scholarly references to the origins of the ESP. In the 1970s, the U.S. agency Doyle Dane Bernback and the U.K. agency Boase Massimi Politt became known for the emotional appeals in their advertising, though emotional appeals were used earlier (Tuck 1976). In the 1980s, Bartle Bogle Hegarty formally referred to its advertising approach as an ESP (Pringle and Field 2010). Some other terms, such as brand selling proposition and organization selling proposition, appear but are not properly conceptualized and have little exposure (Lindstrom 2005).	Tuck 1976; Lindstrom 2005; Pringle and Field 2008
Core benefits proposition:1980s	Urban and Hauser (1980) introduce the core benefits proposition, which focuses on the product benefits promised by physical features. They address a new product design context, which involves the design, evaluation, refinement and fulfillment of a core benefits proposition that seeks to demonstrate what they term “parity plus.”	Urban and Hauser (1980)

As a continuation, the table *Origin and Evolution of the Customer Value Proposition Concept* (see Appx II) provides key literature and timeline for evolution and background of the Value Proposition Concept (Payne, A., Frow, P., and Eggert, A., 2017), starting from 1980s. From the semantic point of view, a concept of value proposition has derived from one of the value notions. Current notions of value are fixed and categorized in the vocabularies of modern English. To identify the exact etymology of value proposition idiom, the author examined Merriam-Webster Online Dictionary of English language for the entry “value” (Mariam-Webster, 2021).

Figure 4 offers a chart of value definitions according to (Merriam Webster, 2021) and a derivative of a value proposition concept in 1988 from the meaning of a value as «something intrinsically valuable or desirable».

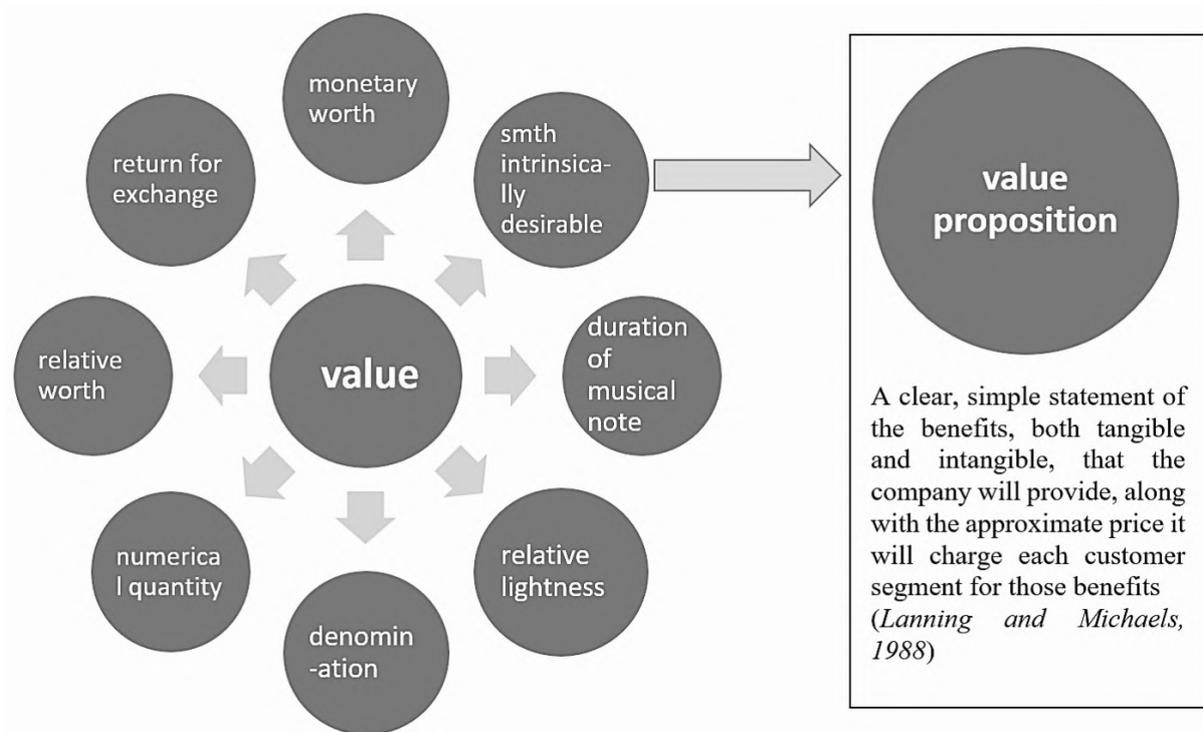


Figure 4. Definitions of values and the detachment of value proposition concept (author)

This Thesis differentiates between semantic context of values in modern English and applies to a value as a part of value proposition defined first by (Lanning and Michaels, 1988) as “a clear, simple statement of the benefits, both tangible and intangible, that the company will provide, along with the approximate price it will charge each customer segment for those benefits”.

This research adopts the following terms in the context of value as a “statement that clearly identifies what benefits a customer will receive by purchasing a particular product or service” (Rintamäki et al, 2007):

- Value.
- Value Proposition.
- Customer Value.
- Customer Value Proposition.

1.1.6 Value proposition in air transportation

Competitive advantage after recent liberalization delivers new challenges; a requirement to identify and provide values for the passengers, as well as delivering the internal value, should be taken into consideration by the aviation industry. In aviation traditional dominant values are price, comfort, and speed, and it has been dominating for decades (IATA Passenger Surveys, 1991-2019; Bain&Company, 2011).

Business models traditionally adopted by airlines, based on the strategies of low-cost or full-service, are insufficient to relate to the new market reality, (Gassmann et al., 2014).

The search for new ways to operate an airline in the market and deliver value to customers is identified in the study of (O'Connell and Williams, 2005), which shows this trend and the need for the adoption of new business models in the sector, relating this to key components that must be considered. This trend is also supported by (Franke, 2007) and (Daft and Albers, 2013).

As in the recent decades when commercialization of air transportation initiates competition and, subsequently, new values search, there are already examples of new values successful introduction in aviation: business low cost with JetBlue in 2016; To connect the brightest minds of San Francisco and Helsinki for Slush 2016, Finnair will fly exclusive direct flights between these two start-up capitals. KLM launches Meet & Seat, explaining “Meet & Seat facilitates contact with fellow travellers who have the same background or interests, making air travel even more stimulating for KLM passengers” (KLM, 2012).

Existing and new customer preferences' identification has been conducted by industry actors through the passenger surveys and aviation experts' interviews. For example, IATA undertakes passenger surveys every year. The methodology it uses includes multiple answers and direct answers with the preset questions. IATA does not use the term “value” and does not make any visible effort to identify values specifically, though it might be possible via survey results analysis.

No known efforts were made to ask respondents to identify values using their own words. Also, no known research was conducted to recognize values analyzing existing value proposition offered by industry players.

1.1.7 Value in air transportation: retrospective

Throughout the history of air transportation, the focus placed on consumer value has shifted. There are several driving forces at work here, including technological advancements and the emergence of new business models. In the early days of air transportation, cost was not a significant consideration. In the historical archives, there are very few posters or files that show the value of anything. The emphasis was on fundamental aspects such as air connections or routes, as well as the mode of transportation itself. Even the quality of the seats was rudimentary in order to allow for a safe take-off weight. There was minimal protection from severe weather or noise; a passenger simply needed to be carried from point A to point B in a

somewhat harmless manner.

After introduction of reasonably dependable passenger aircraft such as the Junker Ju-52 and the Douglas DC-3, the necessity of integrated route networks increased. This introduction allowed first hubs to appear, making it possible for passengers to create flight connections. First services like food and beverage on board created the profession of flight attendants. Long-haul flights started after World War II. In an environment of more regulated airfares, efforts to increase customer value focused on on-board service (Bieger et al, 2007). Flights started their differentiation by introducing classes for passengers. Added value was demonstrated in the difference of seats and cooks: first class cooks and comfortable wide seats appeared among first values beyond speed. During the end of 1960s and beginning of 1970s, when wide-body aircraft were introduced and the demonstrative effects of uncontrolled domestic services were demonstrated in the United States, price regulation began to deteriorate. New features for passenger comfort, including as television and audio systems, have been introduced recently. The emphasis, on the other hand, was on pricing and expenses. Reduced expenses of mass transportation, along with an increase in the number of passengers per plane, enabled more price difference. In addition to the official Foreign Air Transport Association rates for international services, lower-cost, grey-market pricing for international services have arisen. Customer value is no longer just dependent on transportation quality but is increasingly dependent on cheaper fares as well. In the recent decades commercialization of air transportation initiates competition and, subsequently, new values search.

The bilateral systems of air services agreements (ASAs) between countries were formed as a result of the 1944 Chicago Convention on International Civil Aviation, that has taken control over the global air transportation since that time. In the developing worldwide air transportation industry, every country's national airline served routes, air companies charged essentially equal rates, airlines shared markets as well as earnings on a frequent basis.

Some bilateral aviation services agreements (ASAs) also included rules controlling accountability for things such as passenger and aircraft ground management, which were not always followed. When it came to the conditions of bilateral agreements, it was a reflection of the bargaining and present air transportation legislation of the nations, and the resultant efficiency was sometimes relatively poor, while the expenses were frequently extremely high (OECD, 2021).

Because of the ongoing deregulation of air transportation markets, the international air transport sector regulatory system has been characterized by a steady decline since the end of

the 1970s. These trends began from the liberalization of the United States domestic market in 1978 (Burghhout, 2016), was followed by the deregulation of the domestic markets in the 1980s in Australia, the United Kingdom, New Zealand, and Canada, and culminated with the full deregulation completion of the European Union in 1997. As a result, airlines are more able to deploy their resources according to their needs in terms of space and time. As a result of deregulation, the world's air transportation sector has grown significantly more competitive (Bieger and Wittmer, 2016).

Airports of the past were competing mostly in term of finances: the price was the key element of competition. Nonetheless, today's reality dictates the idea of insufficiency for airports to compete on prices only. Airlines have more complex needs than ever before, and using financial incentives no longer has the impact it once did, stated John Jarrell, Head of Airport IT Amadeus (Jarrell, 2018).

Competing from another airports and newer transportation hubs is a significant motivator toward modification, and airports realize it not to be feasible any more incentivizing only on the basis of cost savings. Instead, they should concentrate on providing clients with more complete advantages.

Typically, the majority of airports placed less emphasis on capturing real value proposition for their passengers than on the branding. In the traditional understanding of airport markets, catchment areas, traffic patterns, and price incentives all played a role in their development. These were arbitrary criteria that failed to take into consideration the individual passenger, the long-term development of the airline, or the necessity for the airline to react quickly to market signals.

Adequate value proposition was a last-minute addition that failed to take into account considerations other than the costs even in the airports which were subjected to competition.

In the meantime, the European Commission is looking into a list of rural airports that have received government assistance. Among the cities under consideration are Alghero, Angoulême, Angoulême-Ville and Nîmes, Canary Islands, Dortmund, Dubrovnik, Groningen, Hahn, Isles of Scilly, Leipzig-Halle, Marseille, Niederrhein-Weeze, Ostrava, Saarbrücken, Schönefeld, Stretto, Tirstrup and Västers.

The changes dictated by the air transport liberalization process led to an increase in competitiveness (Lima and Okana, 2020). Rudny (2013) emphasizes the differences in the approach to maintaining value and the ability to generate value. Alexander Michael, Director of Consulting, Digital Transformation and Diogenis Papiomytis in their article "Strengthening

the Airport Value Proposition” (Michael and Papiomytis, 2017) state that a cost competition is no longer the only driver. Instead, for example, airports should concentrate on developing a more complete value offer that takes into account the economic requirements of the surrounding communities as well as their own.

It expresses the value it creates as a liable business which takes a serious responsibility for the area around, as evidenced by its unwavering commitment to development and sustainability. Aena corporation operates 46 Spain airports as well as 16 airports beyond its home country; as a result, it has surpassed all other airport operators in the globe by passenger counts. Following up on the interviews with industry practitioners, airlines and airports, each airport establishes value proposition aimed at every client goal which is supported by the data collected throughout the research. Communicating this value proposition efficiently creates now a vital aspect of any modern-day airport.

Figures 5, 6 and 7 are showing the history of the main air transportation parameters like speed, range and size from the 30s till the year 2020.

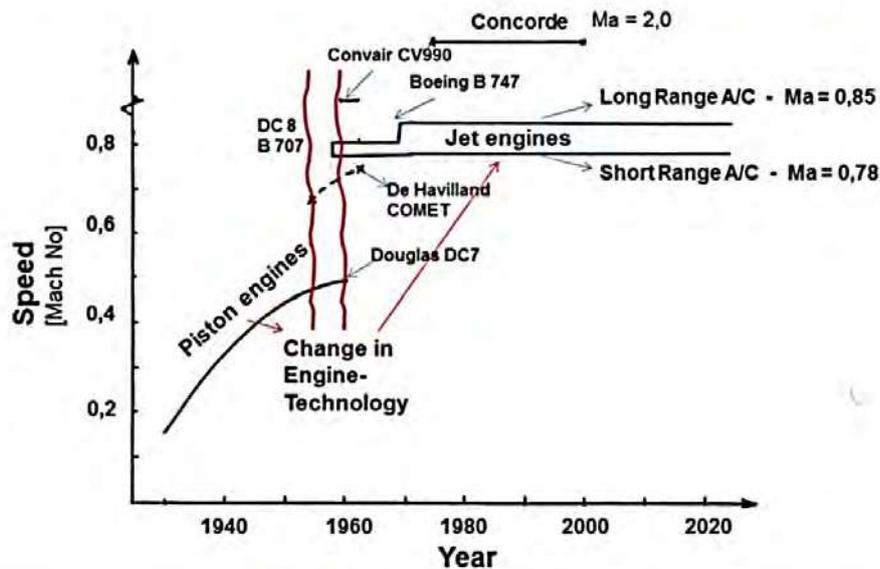


Figure 5. Development of Speed/Year ratio (Schmitt and Gollnick, 2016)

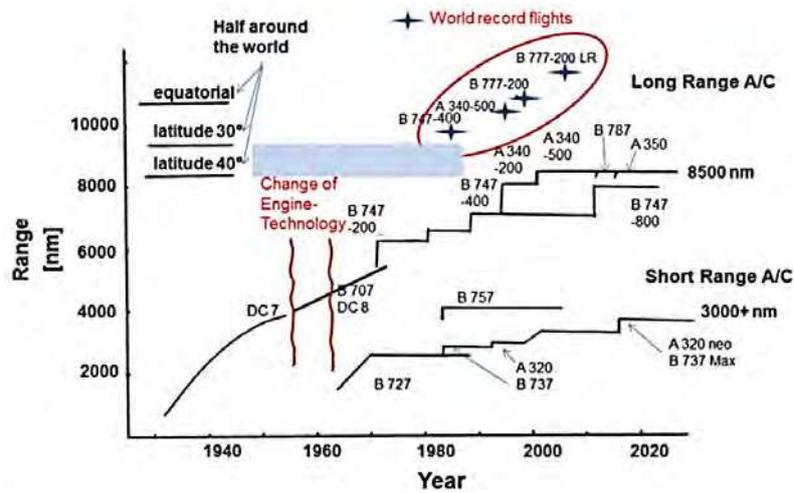


Figure 6. Development of Range/Year ratio (Schmitt and Gollnick, 2016)

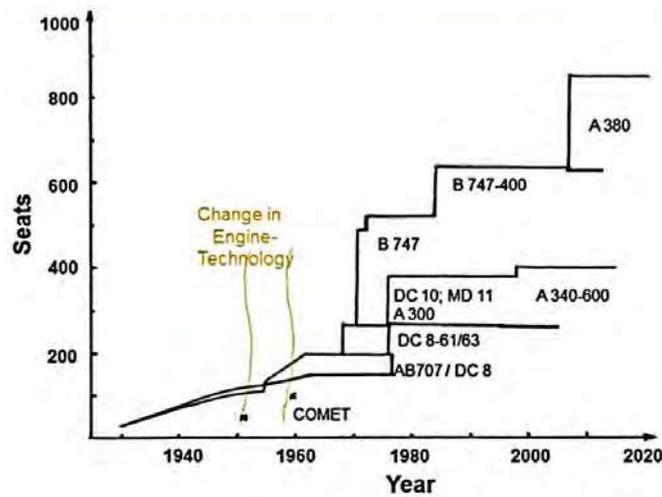


Figure 7. Development of Seats/Year ratio (Schmitt and Gollnick, 2016)

Table 4 provides an insight into value shift derived from the ratio graphs in aviation transport through history, from speed and safety in the early 20th century to ecology and sustainability in the early 2000s. It is worth noting that values were added instead of changing one to others.

Table 4. Air transportation value shift through history (Author)

Value	Period	Example
Speed, safety	1910-1920	no posters with price, speed only
Speed, safety, comfort	1930-1960	on-board service introduced
Speed, safety, comfort, price	1970-2000	deregulation of air transport markets leads to price competition
Speed, safety, comfort, price, ecology, sustainability	2000-present	airport as a driver for growth for the surrounding region

1.1.8 Air Transport economic characteristics influencing value proposition

The aviation industry is exposed to a range of particular characteristics - such as unstable fuel prices, confrontational trade unions, overcapacities, economic downturn,

ineffectual management, insufficient profitability, as well as unpropitious events like terrorist attacks, disease and natural disasters outbreaks - intensifying its turbulent and highly volatile nature (Brunger, 2010; Franke and John, 2011; Malighetti et al., 2011; Morrell, 2011).

Due to the relevantly recent deregulation of air transportation and high dependence on the security policies, common specific features define value proposition in the industry. (Baxter, 2019) developed a range of economic characteristics that influence and drive value proposition “within the air transportation industry:

- *Perishable product*: the airline product is intangible in nature, which is instantly perishable and cannot be stored.

- *Similar product*: inside a service category, the essence of an airline's product is homogeneous; hence, the offering is highly comparable between carriers. The International Air Transport Association notes “that the core transportation service is not differentiated across airlines, at least not within the broad types of airlines (full-service network airlines, low-cost airlines)”. Furthermore, new product initiatives are quickly imitated by rivals.

- *Low marginal cost structure*: in the airline industry, high fixed costs exist at the individual airline level. The International Air Transport Association has stated “that the variable costs per aircraft, however, are significant and have increased as jet fuel prices have risen over the past few years”.

- *Significant exit barriers*: even when certain airlines exit the market, aircraft capacity often stays on the market until the far future. Airport infrastructure (boarding gates, airport slots) never completely vanishes and may be brought to operation at minimal marginal cost. (Berlin Brandenburg Airport constructed in 2011, licensed in 2020), even if these assets are left idle for some time.

- *Capacity*: growth within the existing route network - the aircraft acquisition may be required to accommodate traffic growth that has resulted from either an expanding market or an increase in market share; and new capacity may be required to satisfy new missions, such as the operation of ultra-long-haul services, may require additional capacity.

- *Industry growth*: the rise of the airline business has been quick, erratic, and geographically heterogeneous. This volatility has led to recurrent brief moments of prosperity, even during periods of poor average returns; these unstable periods also result in a cautious approach to value proposition.

Three premium start-up airline companies Silverjet, MaxJet and Eos which offered business class flights on New York - London route can work as an illustration of market

volatility. The moment of their release was optimal. As the demand for business class travel between London and New York peaked, both the stock market and private equity and venture capital money were ready for new businesses. However, established airlines had a strong incentive to preserve their shares of the lucrative premium market. Thus, it was essential from the start for Eos, MaxJet, and Silverjet to establish that their different value propositions would give them with competitive advantages that full-service carriers could not reproduce. Only if they could provide something that others could not, would they be able to withstand competition against incumbents with more resources. All three enterprises ultimately failed.

- *Heterogeneity of conditions*: In specific air travel markets, airline positions tend to be more diverse. While the market between two origin-and-destination or city-pairs may be the core market for an airline that provides direct service, it is often a minor market for an airline that provides the service via a transfer link at its hub. It is less probable that such diverse rivals will be able to escape intense pricing competition. The International Air Transport Association have noted that “airlines are exposed to the specific policy context in their home markets.”

The above-mentioned examples witness that there is an intense competition among aviation companies, but it does not lead to the new value search. Table 5 summarizes factors influencing value proposition in aviation. This table provides the factor, its economic characteristics and specific impact on value.

Table 5. Factors influencing value proposition in aviation (Author’s construction)

Factor	Economic characteristics	Impact on value
Perishable product	aviation product is immaterial in nature, rapid-perishable, not stored	in the short-term, expenses to provide capacity are unmet; pressing price discounting
Similar products	the airline product is homogenous in nature, similar across airlines	novel products initiative is quickly imitative by competitors; no differentiation value
Low marginal cost structure	low marginal costs, high fixed costs for additional passengers	dependence on high fixed costs restricts value proposition range
Significant exit barriers	long term aircraft and airport capacity; rigid full-service network carrier business model	fixed unalterable value proposition; any additional ways of utilizing existing resources are beneficial (e.g. by pursuing new values)
Capacity	New aircraft and airport capacity: long term return on investment	capacity is fixed / inflexible problem: underutilization (if insufficient demand) inability to increase capacity easily
Industry growth	volatile and heterogenous	unstable periods cause a conservative approach to value proposition
Heterogeneity of conditions	Airports and air carriers are subject to the specific policies at their domestic market	it impacts the competitive collaboration between the companies in a way not related to value proposition or efficacy; so, no need for new values search
Recent liberalization, monopolization	less competition	Value as an afterthought

Chapter 1.1: conclusions

1. Concept of value proposition derives from the idea of value as what people like or need. In what people believe influences crucially on the economy development. Value proposition could be seen as beliefs reflected by entrepreneurship.

2. Creating value is one of the key goals of the business. Introducing new values is one of the main tasks for today's successful company.

3. Value shift reflects changes in the economy and society. Since the early 2000s the latest trends have cemented the room in the modern values theory for reducing good-for-client into the good-for-all, meaning benefits for the society.

4. Phenomenon of value comparability and relation is under discussion in the modern research society. The concepts "the Unidimensional Chaining Argument" and "normative assessments of preference" are introduced.

5. The traditional values in air transportation are price, quality and speed. In the recent decades, commercialization of air transportation initiates competition and, subsequently, new values search.

6. No known efforts were made to ask respondents to identify values using their own words and no known research were conducted to recognize values analysing existing value proposition offered by industry players.

7. Value creation is one of the main company goals, and after the recent liberalization air transportation industry faces the unmet need of identifying new value proposition. Automatization of this process would be beneficial as it saves time and efforts and offers significantly more values comparing to the manual process of value identification on the market.

1.2 Developing Value Proposition in Aviation as One of the Strategic Priorities

This study emphasizes the value proposition, which is one of the key objectives in the process of defining the organization's strategy. As will be seen in the subsequent chapter, the concept of a value proposition is inextricably linked with the firm's goals, objectives, and resources.

1.2.1 Strategy in the context of modern business environment

Back to ancient times, the origins of strategy in war councils can be identified. In his manuscript "The Art of War", the Ancient Chinese Military Leader Sun Tzu was discussing military strategy in the 4th century B.C., and thus the strategy was first mention in today's

known sources (Tzu, 2009). Colin Gray (1999) considers military planning to be a practical topic in his writings. To him, it's a "how to do it" manual, the crucial link between military might and political goals.

The application of strategy to management began in the 1950s and evolved over the subsequent decades. Technology advancements in World War II created a complex landscape with a plethora of opportunities for businesses exploitation. Chandler and Ansoff were among the first authors to publish papers on strategic planning in the 1960s. (Chandler, 1962) defined strategy as the determination of an enterprise's fundamental long-term goals and objectives, as well as the implementation of courses of action and resource allocation necessary to accomplish these goals. His primary emphasis was on how businesses could grow and how to create administrative structures that are compatible with that growth. Based on his managerial work experience, Ansoff introduced an idea of strategy being linked to financial benefit over competitive advantage (Ansoff, 1965).

Andrews (1971) was the first to introduce organizational strategy as a concept in his work "Personal values and corporate strategy". He particularly focused on the impact of strategy in an unknown setting. He also claimed that strategy is developed by recognizing exterior opportunities and risks on a market, as well as inner weaknesses and strengths. The objective is to capitalize on opportunities and strengths while overcoming challenges and weaknesses. Andrews characterized strategy as the pattern of priorities, aims, major policies, and goals, as well as the plans for accomplishing those aims and goals.

According to Hatten et al. (1978), a successful strategy would typically define the organization's current and expected reach, field of operation, distinguishing competencies in terms of resources and skills, the synergies that emerge from the company's ability and resource deployment. Two of the most eminent business strategy writers are regarded to be Johnson and Scholes. They agree the strategy's primary concerns should be with the firm's role and direction within its competitive environment.

Johnson and Scholes (1997) coined the term 'strategic fit,' which refers to the alignment of organization's scope of operations with its environment.

Michael Porter, an expert on competitive strategy, claims firms suffer from mediocre results consequently of random strategic choices market positioning or failure to execute strategies (Porter, 1985; Porter, 1987).

Table 6 reflects the development of key strategic management notions in the schools of thought in the decades followed the Second World War.

Table 6. Development of key strategic management notions in the schools of thought in the decades followed the Second World War (Mintzberg et al., 2003)

Schools	Prescriptive					Descriptive			
	Design	Planning	Positioning	Entrepreneurial	Cognitive	Learning	Political	Cultural	Environmental
Key author(s)	(Andrews, 1976)	(Ansoff, 1965)	(Porter and Porter, 1980)	(Schumpeter, 1934)	(Simon, 1976)	(Lindblom, 1955) (Quinn, 1989)	(Alison, 1971)	(Normann, 1977)	(Hannan and Freeman, 1977)
Base discipline	None	Systems theory, cybernetics	Economics	None	Psychology	Psychology	Political science	Anthropology	Biology
Vocabulary	SWOT model, fit	Formalizing, programming, budgeting	Analyzing, generic strategy	Vision, leadership, innovation	Bounded rationality, map, mental model reframe	Incremental, emerging	Power, coalition dominant	Ideology, values	Reaction, selection, retention
Central actor	President/director	Planners	Analysts	Leader	Brain	Everybody who learns	Everybody with power	Collectivity	Stakeholders
Environment	Opportunities and threats	Stable and controlled	Analyzable in economic variables	Manoeuvrable	Overwhelming for cognition	Demanding	Intractable, malleable	Incidental	Dominant, deterministic
Strategy	Explicit perspective	Explicit plan	Explicit generic positions	Implicit perspective	Mental perspective	Implicit patterns	Positions, plays	Collective perspective	Specific position

The concept of strategic management was introduced to academy aiming to assist in establishing a company's strategic course and aligning operational processes with that direction (Mintzberg, 1994; Steiner, 1997). Although business management is well on its way to mastering the art of preparing and developing new organizations, various scholars and managers allude to an as yet-to-existing formalized strategic planning framework that offers a view of how-to guide strategy. In this context, any effort or development aimed at improving the firm's strategy or aims would include activities such as developing new offerings, shifting priorities, and working on different aspects of the existing operations (Ansoff et al, 1976).

The popularity of structured strategic planning stems from the inferred assumption that it has a positive correlation with organizational behavior (Dyson and Foster, 1980; Pearce et al., 1987). In this regard, planning refers to the roles of various managers at various levels of the organization, each according to the nature of their responsibilities (Bradford and Duncan, 2000). Some researchers (Pearce et al., 1987; Rhyne, 1986) stressed the profit motive for strategic planning and believed that a company could create a strong market position by concentrating exclusively on financial efficiency.

Although (Drucker, 2009), the philosopher and educator whose ideas contributed to the intellectual and practical underpinnings of the modern management concept, believed that "strategic planning "change" was a crucial to growing a business, later writers (Bain and Company, 2011) amplified on the change idea as "a simple" business growth. This was due to the effect that a systematic strategic planning has on the processes being institutional, financial, and operational in nature: they believed formal planning had a role in facilitating overall system changes in addition to large-term planning. for both the manager and the enterprise to come up

with a complete and structured understanding of the company's goals and methods, coupled with the ability to take on tough challenges as a major and necessary requirement for enterprise-wide strategic planning.

1.2.2 Aviation strategic management

Aviation strategic management is not a universally accepted discipline with a precise definition. This discipline title may denote a variety of different concepts and scopes. This necessitates the specification of the exact meaning and scope of this analysis. Flouris and Oswald (2006) classify aviation strategic plans using 3 broad groups: industry-level strategies, state-level aviation strategies, and corporate-level strategies (Figure 8). Every plan varies in nature and length and is created by a different entity.

This study is focused on corporate-level aviation strategy, that can be developed independently for aviation businesses, such as airlines, airports, and ground service companies. Notwithstanding the reality that the baseline type of aviation strategic planning addresses both sector- and state-level plans, the study does not specifically account for them.



Figure 8. Different levels of aviation strategies (Flouris and Oswald, 2006)

One of the ways to look at aviation strategic management is with the help of a well-known Porter's 5-Forces framework for analysis an organization's competitive environment. In 2011, IATA worked with Harvard's Professor Michael Porter to look at the competitive interactions and their influence on airline profitability and the result is illustrated in Figure 9.

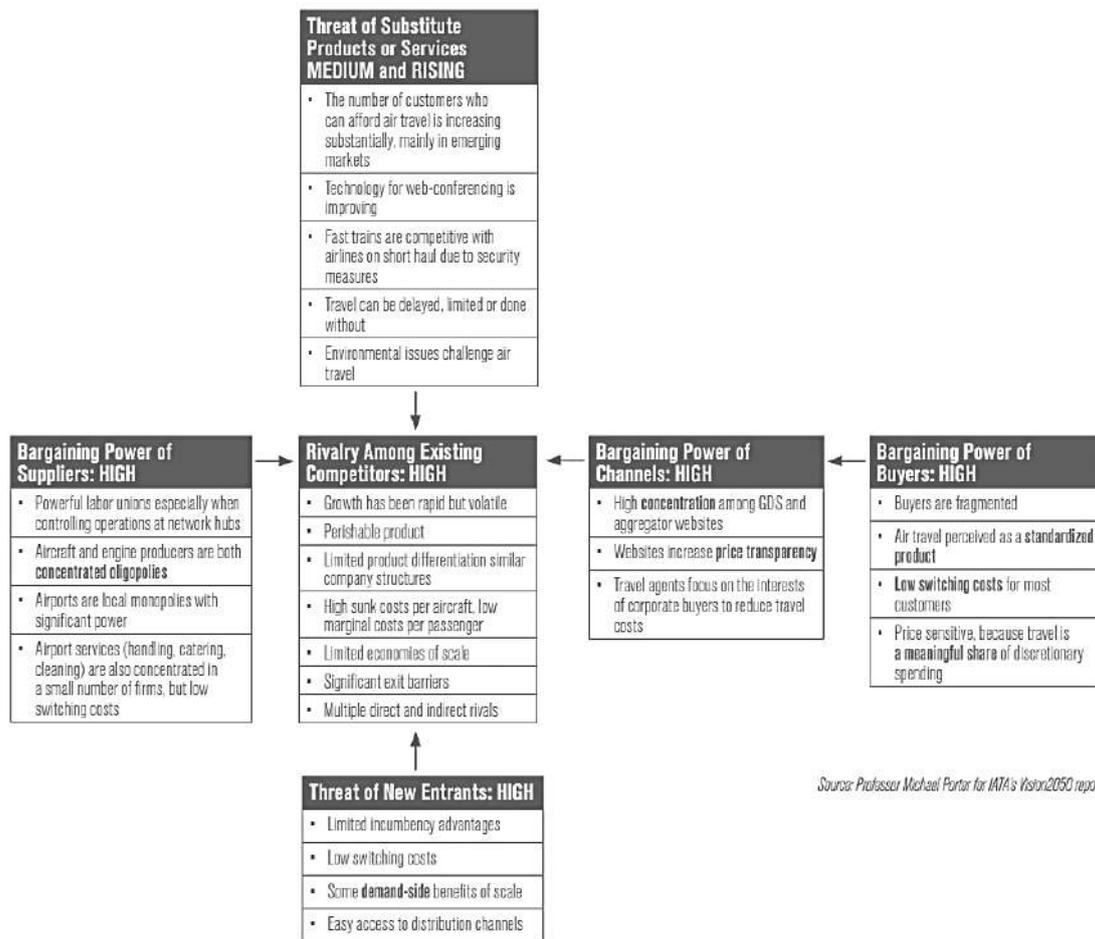


Figure 9. Porter's 5-forces model of the airline industry (IATA, 2013)

Porter (IATA, 2013) made a conclusion about several industries in which the “5-forces” performed as powerful as in the air transportation industry:

- “The bargaining power of suppliers is high, with powerful labor unions especially at hub operations, concentrated oligopolies in aircraft and engine manufacturing, local monopolies at airports and increasing concentration in the supply of services;
- The bargaining power of the GDSs is very high, since each of the three major GDSs is insulated from competition by their market power. • Buyer bargaining power is also high, largely because of the perceived commoditization of air travel and low switching costs;
- The threat of substitute services is medium and rising, with improving technology for web-conferencing and competition from high-speed rail on short haul markets;
- The threat of new entrants is high, with easy entry into many markets, easy access to distribution channels and limited incumbency advantages;
- Rivalry among existing competitors is high, partly because of the economics (high sunk costs per aircraft, low marginal cost per passenger, perishable product, limited economies of scale) but also because of government constraints restricting consolidation through exit or

cross border merger. Also, because indirect distribution channels currently encourage commoditization and competition on price and schedule alone.”

1.2.3 The institutional framework of the civil aviation administration

The civil aviation administration's institutional structure establishes the process for effectively and efficiently coordinating the national aviation programme elements. It establishes the regulatory basis for civil aviation activities in the country and organizes administratively, which includes a Civil Aviation Authority (CAA), as well as responsibilities with the enrolment in of the administrative and regulatory functions in civil aviation, involving:

- Flight Licensing and Operations,
- Air Transport and Airworthiness,
- Air Traffic Services,
- Aerodromes, Telecommunications

This institutional structure similarly covers restructuring policies: creation the independent civil aviation authority for overseeing industry's security, protection, and environmental responsibilities, as well as planning for airspace management. In the majority of cases, restructuring often results in the establishment of regional airport authorities for smaller airports that can be combined into commercial units and commercially autonomous airport authorities for larger airports. The institutional structure is critical for the development and growing of the states' aviation industry, as it has the direct effect on the production and efficiency of the industry. International Civil Aviation Organization (ICAO) (ICAO, 2006) urges governments and civil aviation departments to provide an effective institutional structure for the civil aviation system in this regard, together with "the establishment of a civil aviation authority (CAA) and/or other relevant authorities or government agencies, headed by a Chief Executive Officer and supported by appropriate and adequate technical and non-technical staff" (ICAO, 2006b).

This dissertation utilizes a definition of civil aviation from the online Cambridge Business English Dictionary (Cambridge Dictionary, 2021) entry: “civil aviation: flights and aircraft used for personal and business purposes, such as transporting goods or passengers, rather than for military purposes” and explores value proposition of civil aviation activities according to the (ICAO, 2009) working paper “Review of the classification and definitions used for civil aviation activities”. Figure 10 offers the Proposed ICAO Classification of Civil Aviation Activities:

PROPOSED ICAO CLASSIFICATION OF CIVIL AVIATION ACTIVITIES

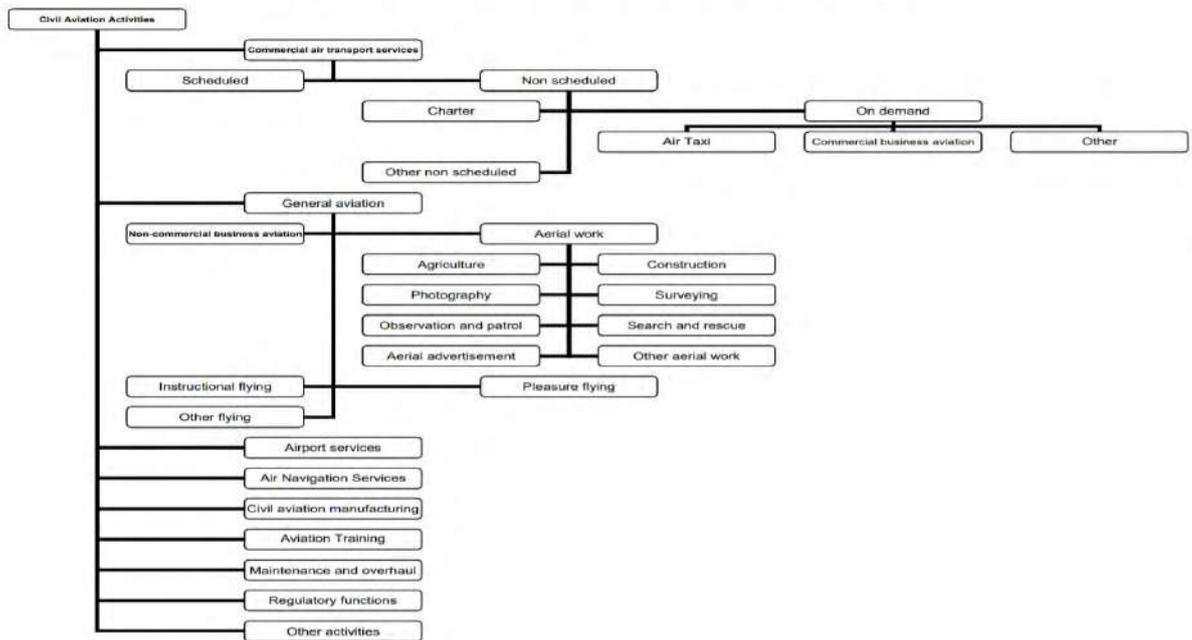


Figure 10. Proposed ICAO Classification of Civil Aviation Activities (ICAO, 2009)

1.2.4 Liberalization of air services

The 1944 Chicago Convention (ICAO, 1944) provided the framework for operation of international air transportation; this framework regulates commercial rights of airlines on international routes through a complicated network of bilateral air services agreements (ASAs) between each pair of countries. These ASAs govern a broad variety of criteria determining the supply of international aviation services. The World Trade Organization (WTO) Secretariat (WTO, 2006) identified seven features of ASAs as relevant indicators of openness for scheduled air passenger services:

- (1) Grant of rights (air freedoms allowing airlines to provide services over designated markets);
- (2) Capacity clause (regulation on volume of traffic, frequency of service, and/or aircraft types);
- (3) Tariff approval (whether fares need to be approved before applied);
- (4) Withholding (which defines the conditions for a foreign carrier to operate, such as ownership and effective citizen control requirements);
- (5) Designation (which governs the number of airlines allowed to serve the market between two countries and on specific routes);
- (6) Statistics (which requires the exchange of operational statistics between countries or their airlines);

(7) Cooperative arrangements (which regulate the cooperative marketing agreements between airlines).

In view of the above, Aviation Strategic Management *challenges* can be identified as following. The increase in air traffic in some parts of the world has reached the limits of airport and airspace capacity before the COVID-19 pandemic outbreak, requiring new approaches to air traffic management and technologies to radically increase its intensity without compromising flight safety. Further increase in the passenger turnover of world air transport may in the future be limited to the number of resources used by aviation, as well as create an unacceptably high burden on the environment. New technologies are needed to resolve the contradictions between the growth of aviation mobility and resource, environmental and safety requirements. Modern air transport is highly vulnerable to technological and terrorist threats, traditional ways of combating which significantly reduce the quality and accessibility of air travel: requires technologies for screening and control of passengers and cargo, allowing without external intervention to identify potentially dangerous situations.

1.2.5 Strategic planning and aviation policy development

The aforementioned definitions of the strategic management process are encompassed in (Phillips, 2006) proposed definition of aviation management as the study and practice of general business processes used to achieve targeted objectives in the aviation industry. The essence of strategic planning is encapsulated by this extended definition, which is centered on accomplishing specific goals. Additionally, the difficulties inherent in forecasting the future pose significant difficulties for policymakers. Predicting the behavior of civil aviation systems is difficult in the majority of sectors, including aviation.

As an example, airport strategic planning encompasses more than just security and safety; it also includes a vision for airport management in the future. With the primary aim of providing an infrastructural system and transportation facilities, airports have evolved to accommodate the changing needs of their clients, and, in the process of strategic planning, airports have improved (Walker et al., 2001). Vancouver Airport, for example, developed from a local airport assisting the neighborhood into an international port connecting Europe, Asia Pacific, North America and Latin America (Vancouver International Airport Authority, 2013). There are many reasons when authorities decide to found an airport. Competitive advantage and competition are two of these reasons. Airport operators differentiate themselves from competitors by offering enhanced value propositions varying from capsule hotels to fine dining.

Management solicits input from various groups of people, such as employees and passengers, during the strategic planning process. Airport management considers the opinions of airport visitors in several instances, including commercial and retail entities customs, ground handling agents, immigration authority, passengers, security, staff, and state authorities participated in the airport's funding. When management develops a strategic plan, it incorporates the majority of the airport's perspectives and needs. Since airports serve diverse groups of people, ranging from airport tenants to air cargo operators and passengers, it is important for the needs of all these groups to be taken into consideration during the strategic planning process (Towfiqi, 2018). Creating a strategic plan, an air transport company takes into consideration a lot of factors that could be united under the notion of sustainable development.

1.2.6 *Issues in air transportation*

(Mootien et al., 2019) explored major issues in aviation that can be address when creating value proposition in air transportation. According to the research based on experts' interviews, nine groups of problems could be identified. Those groups were categorized as economic, environmental, legal, political, social, technological which is reflected in Table 7.

Table 7. Issues in aviation characterized and explained, (Mootien et all, 2019)

<i>Issue</i>	<i>Description</i>	
	<i>Category</i>	<i>Comments</i>
Local environment	Environmental	Issues include air quality and noise.
Climate change		Broadly includes any issue related to the increased generation of greenhouse gases due to human activity.
Oil supply		This refers to issues related to the dependence of the aviation sector on oil and its derivatives, both from short and longer term perspectives.
The economy	Economic	Economic factors might include changes in economic activity levels from the personal to the global level.
Social norms	Social	Social norms reflect the prevailing cultural influences on operator and traveller behaviour.
Demographics		Age, gender and wealth characteristics of particular population segments.
Disruptive events	Political, Legal and Technological	Unusual occurrences that disturb planned operations.
Regulation		This refers to the influence of institutional, regulatory and planning regimes.
Capacity		Pertains to issues limiting the supply of aviation activity.

1.2.7 *Sustainable development and innovation*

(ICAO, 2019) in its Future of Aviation letter states that “Mobility and its pillars of transport (air, inland and maritime) are at the very center of our socio-economic fabric. They

underpin social connections and facilitate access to goods and services, including trade, jobs, health care and education. In today's world, mobility by air, road and water is all about efficiencies, speed, interconnectivity and accessibility by all."

To promote innovations in aviation, ICAO held ICAO Aviation Innovation Fair in September, 2019. The TT19 session "Innovation in Aviation = Value Added for New Mobility" demonstrates "how aviation advances and transforms mobility and impacts development" through cutting-edge technology, innovative solutions, and emerging modes of aviation. The debate over "aviation innovation" demonstrates how advancements in the sector have an effect on different industries and transportation modes (ICAO, 2019).

The minutes of TT19 session concluded, that "that way, airspace is quickly becoming congested and air traffic is slated to double over the next two decades" (ICAO, 2019), despite COVID-19 outbreak which will eventually end up in free movement around the world again. The minutes continue with the idea about the reality that is "in order to accommodate the forecast growth - drastic improvements and efficiencies for airports and air traffic management will need to be found. For this - we need innovation".

ICAO session TT19 (ICAO, 2019) states that "aviation is already known as a driving force of global technology development and innovations:

1). Engines and aircraft become lighter, quieter and more efficient. Emerging technologies are reshaping with robotics, artificial intelligence, the internet of things, unmanned aircraft systems and the push for hybrid and electric airplanes - just to name a few.

2). Alternative fuels can significantly change the current scenario of aviation in support of the environmental protection.

3). The vast investment in Artificial Intelligence (AI) and Big Data could be seen as a promising way of increasing safety, efficiency and sustainability. These technologies can help improve aviation infrastructure and airspace utilization.

These innovations relate primarily to moving goods for now - but they will quickly become viable for moving people as well.

This wave of innovations in aviation will surely impact the wider transport sector as well as the 2030 Agenda for Sustainable Development".

Chapter 1.2: Conclusions

1. The integrated development of environmental, economic and social spheres determines the aviation of the future. This study focuses on the development of aviation at the corporate level. At this level, development decisions are made using a tool such as strategic management.
2. Decisions on the goals, objectives and development opportunities of the company are made, taking into account the interests of all stakeholders. This ensures the balance of development and its sustainability.
3. In the face of growing competition and air transportation liberalization, value proposition in aviation is increasing and fast becoming a strategic priority.
4. Many experts in the field of strategy include creating value as a core thing among the potential components of a successful company's strategy.
5. Strategic management can be defined as "the process of building capabilities that allow a firm to create value for customers, shareholders, and society while operating in competitive markets" (Nag, Hambrick and Chen 2006).
6. Strategy as a strategic tool involves: defining the company's vision, mission, goals and value proposition as a prime objective; emerging plans and policies to accomplish the vision and deliver value proposition; assigning resources for implementing those plans policies.
7. Value proposition is derived from the company's strategy to allocate resources. It helps in capturing opportunities and in avoiding threats in the competitive environment.

1.3 Start-up company: a source of concentrated and open value proposition

This subchapter describes the start-ups as a specific company type, proposes to distinguish between a start-up and an established company and evaluates start-ups as data sources for value proposition analysis.

1.3.1 Start-ups in the contemporary economy

European Commission defines start-ups as "often tech-enabled, in general combine fast growth, high reliance on innovation of product, processes and financing, utmost attention to new technological developments and extensive use of innovative business models, and, often, collaborative platforms" (European Commission, 2016).

According to European Commission supported project "European Startups": "start-ups

are the number 1 job growth engine, growing at 10% per year” (European Startups, 2020). Also, start-ups in European Union created approximately 2m jobs in 2020 as Figure 11 shows.

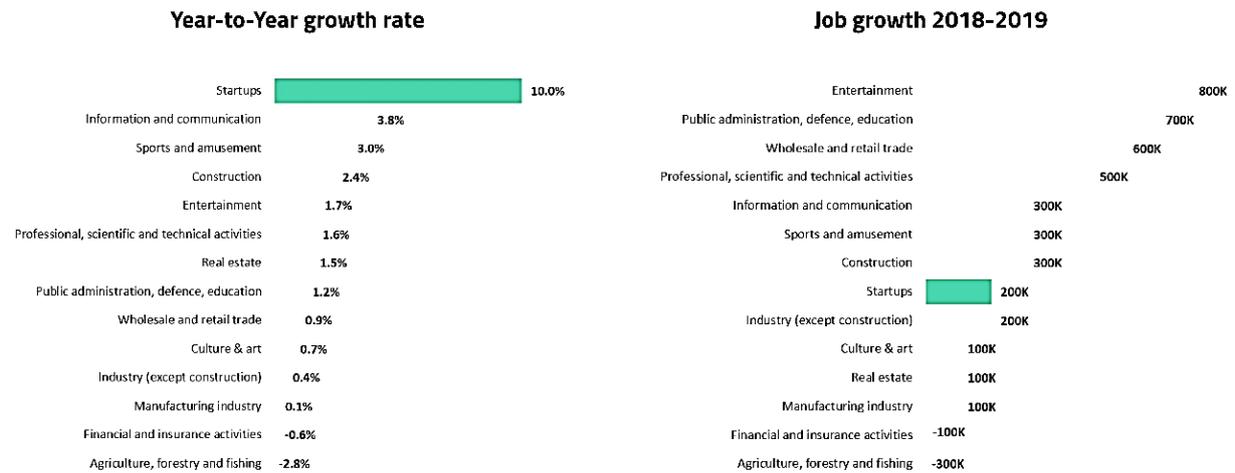


Figure 11. Start-up growth rate and job growth in EU, 2018-2019 (European Startups, 2020)

Fast growth is the goal that a start-up is designed for. A start-up cannot be identified only because the firm was recently founded. Technological innovation and venture capital involved also do not necessarily make a company to be a start-up. (Graham, 2012) claims that "the only essential thing is growth. Everything else we associate with start-ups follows from growth".

Many newly founded companies represent a service sector: barbershops, restaurants, plumbers. They cannot be addressed as start-ups, excluding limited non-typical ones. A beauty salon was not designed for a rapid growth. While an online platform for business jets, for instance, was. A family coffee shop in the city cannot be named a start-up, as well as a franchise is not a start-up. Each of these companies do not plan a fast growth as a priority goal.

Whereas entrepreneurs want to start a start-up, in order to compete, they will need to come up with something rather innovative. A company-start-up must create something that can be sold to global markets, and ideas of this nature to be so valuable that would obviously add value to the large number of clients.

As (Graham, 2012) explains "a start-up is a company designed to scale very quickly. It is this focus on growth unconstrained by geography or number of potential customers, which differentiates start-ups from small businesses".

Ordinary businesses are protected by the same limitations that limit them. This is the cost of doing business. To open a salon implies just that you will have to compete with other hairdressers in the area. A new online platform for business jets must be able to compete with business jet platforms throughout the world.

It can be said that start-ups are sparkles for the whole industries. Both the academic literature and popular media are rife with accounts of entrepreneurs who created such ventures, though the term “start-up” was not applied to them back to those times: Thomas Edison displacing the gas lighting industry (Hargadon and Douglas, 2001) and more recently, Uber, eBay, and Airbnb developing business models that “profoundly impacted and indeed changed the way people live, work, consume, and interact with each other” (Demil et al., 2015).

Entrepreneurs launched new firms that helped to establish industries as diverse as automobiles (Klepper, 1997), management consulting (David, Sine, and Haveman, 2013), mobile gaming (Ozcan and Eisenhardt, 2009), modern Indian art (Khaire and Wadhvani, 2010), residential solar energy (Hannah and Eisenhardt, 2018), satellite radio (Navis and Glynn, 2010), and green building (York and Lenox, 2014).

One explanation for new firms’ success is their flexibility, which allows them “to change direction quickly and to reconfigure strategically” (Nadkarni and Herrmann, 2010). Nascent sectors of industries are characterized by ambiguity and uncertainty that permeates everything from the viability and performance of critical technologies to customers’ needs, the competitive landscape, products’ meaning, and conceptions of value (Rindova and Petkova, 2007; Kaplan and Tripsas, 2008; Santos and Eisenhardt, 2009; Khaire, 2014; Anthony, Nelson, and Tripsas, 2016).

In order to find the best way forward, and that what distinguishes startups, a company’s capacity to effectively adapt and experiment might be critical to its growth in the future. (Rindova and Kotha, 2001; Murray and Tripsas, 2004; McDonald and Eisenhardt, 2019)

1.3.2 Start-up and an established company

The following is a set of features that all start-ups have in common (Pereira, 2020):

Innovation. A business of this type needs to have a differentiator competition in order to gain competitive advantage in the market. The company's goods or business model may include the innovation.

Age. A start-up is a new firm that is yet in the first steps of brand’s managing, sales, and personnel recruitment. Thus, an eight-year-old firm can still be considered a start-up.

Growth. A start-up considers a business which aim is fast growth and expansion, reaching in some cases enormous proportion. It is the feature that among others differentiates a start-up from small-business company.

Risk. When a start-up has shed its revolutionary vigor, there are still a number of related risks linked with assuring its success. Due of this, these companies are regarded as high-risk ventures with a high failure rate.

A Start-up is Funded Differently. As start-ups and small firms have a tendency to begin with funds out of the founders' reserves, family and friends, or a loan, a successful start-up will obtain further investment from venture capitalists, angel investors, and ultimately, an initial public offering (IPO). A start-up's founders share decreases, while firm ownership broadens with each round of investment.

Flexibility. A start-up is a very dynamic and ready to adapt to the adversities that may arise company. Due to the need for validation of your business idea, these businesses need to be ready to tailor their product to meet customer requirements.

Solving a problem. This sort of organization is associated with shed innovation and aims on fixing any market challenge. Consequently, they concentrate on creating a difference not only in the marketplace, but also in the lives of individuals through a product or service.

Scalability. A reproducible and scalable business model is the aim of the start-up company, because in this case business could expand avoiding additional funding and human resources.

Work team. Start-up businesses typically employ a very limited number of workers.

Start-ups are mostly known to be technologically advanced and propose a novel technology. The relationship between this type of firm with technology dates back to the 1990s, since "start-up" businesses are more prevalent among "dot-com" corporations. Although the majority of current start-ups are technical in nature, the notion is not exclusive to them. The core of a start-up is the pursuit of novel ideas that significantly impact a huge number of people.

Start-up and non-start-up companies' comparison table (Table 8), adopted from (Pereira, 2020), summarizes features that can qualify a company as start-up or non-start-up.

Table 8. Start-up and non-start-up companies' comparison table, adopted from (Pereira, 2020)

Feature / Type of Company	Innovation	Age	Growth	Risk	Funding	Flexibility
Start-up	Key role	Not specific	Key role	High level	Aggressive search for any source but not losing independency	High level
Non-start-up	Not necessary	Not specific	Not necessary	Not necessary	Not specific	Not specific

Thorough comparison of start-ups and established companies was made by Kawasaki, in his book *The Art of the Start* (Kawasaki, 2015), see Table 9.

Table 9. Differences between established companies and start-ups (Kawasaki, 2015)

Topic	Established Company	Startup
Positioning	Being all things to all people	Finding a niche and dominate it
Pitching	Sixty slides, fourteen-point font; 120 minutes	Ten slides, thirty-point font, twenty min
Business plan	200 pages of extrapolation	20 pages of wishful thinking historical data
Bootstrapping	Staying in a Hyatt Regency instead of a Ritz Carlton	Staying with college buddy instead of a Motel Six
Recruiting	Corporate head-hunters screening for candidates with Fortune500 or Big Four track records	Sucking in people who "get it" and are willing to risk their careers for stock options
Partnering	Negotiating I win / you lose deals that the press will take	Finding a way to increase sales by piggybacking on others
Rainmaking	Spiffs for resellers and	Sucking up, downs and across Commissions for sales reps

1.3.3 *Start-up and value*

Increasingly, nowadays business environment, data-driven innovation and the production of economic value are generated by several organizations rather than by a single organization or by a conventional value chain (Hein et al, 2019). As a replacement for, combinations of different data form multidisciplinary databases, enriching cross-industrial and socio-tech potential of businesses (Hein et al, 2019; Oliveira and Loscio, 2018; Yoo et al, 2010). Multiple start-ups from one industry domain can be considered as an ecosystem that provides among others information on value proposition.

Start-ups are companies of limited resources, and for them the main alternative to competing directly with well-established companies in the product market is through the novel value proposition. Although, it is feasible to join the market not investing in every aspect of the business, the capacity of developing values from innovations rests entirely on consumer value proposition, instead of simply providing the technologies themselves (Gans and Stern,

2003). To develop and deliver value proposition to the potential customers and investors, start-ups use different tools and a landing page with texts, pictures, video and audio information is one of them. Identifying value proposition from the landing pages of start-ups in air transportation industry is one of the tasks of this dissertation.

Lindic and Marques (2011) think that for customer-focused innovation key accelerator to be value proposition and that it can be measured. Kambil (1996) and Baregheh (2009) assert that because of the complicated nature of the phenomena of creativity, a multidisciplinary method is necessary for its investigation. Strategic management is the important component of this investigation. This is one connection between start-up ideas and technical progress. As a result of radical change in one discipline, significant, solvable problems emerge in other ones. Occasionally, the alterations are large enough to affect the solubility of the material. This sort of transition led to the establishment of Apple; Steve Wozniak was able to produce an affordable computer due to advances in chip technology. In the case of Google, the expansion of the internet was the most significant change. It was the amount of the shift, not the solubility, that altered.

That way it can be concluded that start-ups are among the first companies to react on changes, whether they are technological inventions or business strategies.

Corporations working on new products in their innovative laboratories tend not to open information on new value proposition. Also, corporate research laboratories work on the solutions that cannot be applied to the products under development at the time (Odlyzko, 2012).

One more potential source of innovation proposals that could be used in formatting a new value proposition is a defence industry. But due to the sensitive nature of military development, information on new innovative product is restricted.

As start-ups' goal is to grow and scale rapidly (Giardino et al, 2014) with "high reliance on innovation of product, processes" (European Commission, 2016), information on their landing pages is open and actual; it provides a good data source for analysing existing and prospective value proposition. Figure 12 summarizes the potential of start-up companies to become a source of values for a certain domain.

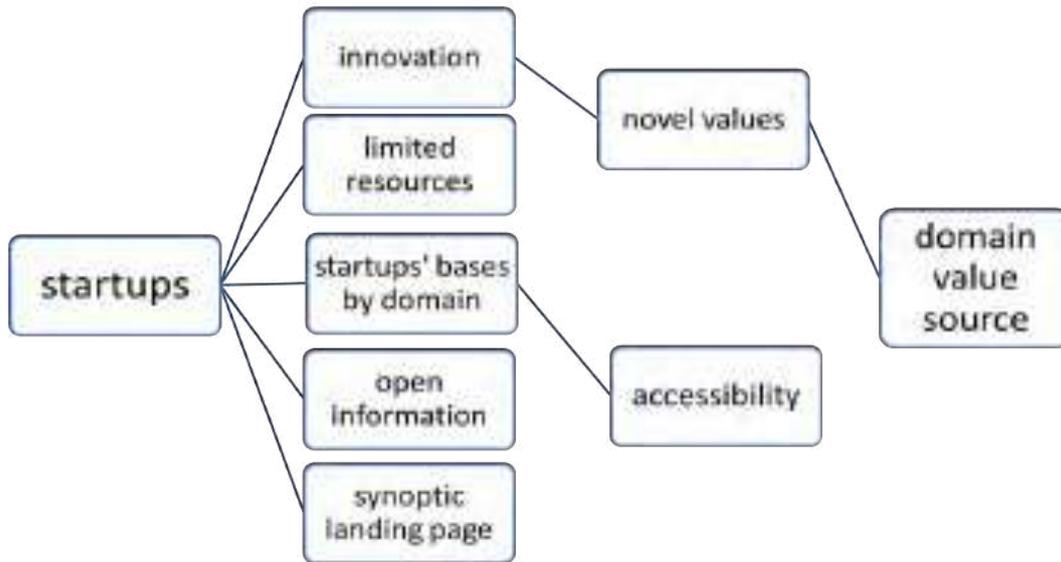


Figure 12. Start-ups as a source for values (author's construction)

Chapter 1.3: conclusions

1. Start-up is a specific company type characterized by fast growth, often tech-enabled, with high reliance on innovation.
2. As start-ups aim at constant and quick growth, they are in constant search of funding, that makes their information to be open and actual.
3. For start-ups as companies with limited resources, the main alternative to competing directly with well-established companies in the product market is through the novel value proposition.
4. As start-ups' information on their landing pages is open and concrete aiming at attracting much attention to their novelty, it provides a good data source for analysing their value proposition.

Chapter 1: concluding remarks

1. At the corporate level of the development of aviation decisions are made using a tool such as strategic management.
2. Many experts in the field of strategy include creating value as a core thing among the potential components of a successful company's strategy.
3. In the face of growing competition and air transportation liberalization, value proposition in aviation is increasing and fast becoming a strategic priority.
4. The traditional values in air transportation are price, quality and speed. In the recent decades, commercialization of air transportation initiates competition and, subsequently, new values search.
5. Value creation is one of the main company goals, and after the recent liberalization air transportation industry faces the unmet need of identifying new value proposition. Automatization of this process would be beneficial.
6. To automate the process of value recognition, start-up companies present a decent data source for analysing value proposition since their goal is to grow and scale rapidly, information on their landing pages is open and actual.

2 METHODOLOGICAL APPROACHES: STATE OF THE ART

In this chapter, the author considers benefits of data-driven decision-making. The author also argues that the novel task of value identification and expansion can be considered as Information Extraction task. Taking into consideration the object of the research – value proposition, it can be observed that companies expressed their value proposition in texts. That way, Information Extraction task can be solved applying Natural Language processing methods. In view of values being words that constitute texts containing value proposition, Named Entity Recognition is examined as a possible technique for values identification and increasing number of values.

Traditional, non-data-driven approaches to decision-making in creating value proposition, such as offered by Osterwalder and Pigneur (2010), typically follow a data-independent, manual approach involving one or few participants.

To model how companies implement their businesses, different Business Models (BM) systems, for example, broadly acknowledged Business Model Canvas including value proposition creation were created supporting a universally accepted interpretation of Business Model in a company. Nevertheless, those typical, non-data-driven decision-making processes experience a number of disadvantages that restrict their utility.

This chapter proposes related works review on NER and Aviation English. Based on the literature review and specifics of the task, the author adopts a new term – Value Entity Recognition (VER).

2.1 Benefits of Data-Driven Decision Making

Traditional approaches to decision making, decoupled from the operational layer of an organization, reflect subjectivity and bias (Di Valentin et al., 2012). Consequently, non-data-driven techniques provide more strategic and high-level inputs and dependent on user inputs rather than “de-facto” data from application systems.. Besides and in addition to potentially arising biases and subjectivity, traditional non-data-driven approaches to business modeling might be more expensive, time-consuming, prone to errors by human decision-makers, and superficial compared to data-driven analyses of BMs (Augenstein and Fleig, 2017; Fleig, Augenstein and Maedche, 2018d). As a consequence, research proposes to link non-data-driven approaches to the operational layer, such as business proposals to improve the contribution of business modeling tools for decision-making (Di Valentin et al., 2012). Thus, the need for data-driven BM tools has been recognized by both research (Szopinski et al., 2019) and practice

(Szopinski et al., 2019; Terrenghi et al., 2017).

The requirement of data-driven Business Processes (BP) in association with application systems and strategy is recognized in the literature. Within the domain of business analytics, Cao and Duan (2017) highlight the importance of data-driven environments for organizations. Especially, Cao and Duan (2017) hypothesize that high-performing organizations rely more on data-driven decision-making and that in high-performing organizations, there is a higher degree of fit between the organizational strategy and business analytics. Besides, Morton and Hu (2008) apply Organizational Contingency Theory (OCT) to examine the fit between organizational structure and Enterprise Resource Planning (ERP) systems and assume that the fit between characteristics of the ERP system and organizational dimensions influences the success of an ERP implementation. In particular, Morton and Hu (2008) highlight Business Process System (BPS) as an essential characteristic of the ERP system. In line with this argumentation, Petruzzi and Garavelli (2007) find a positive correlation regarding the degree of fit between BPs and Information Technologies (IT) and the organizational performance in an OCT contribution.

BPs in organizations might differ profoundly concerning the intended to-be design in process models and the actual as-is process execution (Hwang and Yang, 2002). Traditional, non-data-driven process models might inadequately capture BPs and depict idealized or subjective representations of BPs or lack flexibility in the abstraction of process levels and details (van der Aalst, 2016).

Organizations frequently do not meet the prerequisites for BPS in terms of sufficient comprehension of BPs and possess only limited insights and a narrow understanding of existing processes and BPS contingency factors (van der Aalst and Weijters, 2004). Traditional non-data-driven approaches to BPS rely on "de-jure" process analyses instead of "de-facto" data-driven approaches, which suffer from a number of insufficiencies as they are based on handmade process models which are often biased compared to process reality (van der Aalst, 2011). For instance, "de-jure" process documentations usually only contain idealistic process executions such as the to-be process, while most process variants and deviations from the ideal target specification are ignored (van der Aalst, 2014). Erie Street (2022) collected leading analytical companies' insights on utilizing data-driven Business Processes and prove the benefits of using data for decision-making and business intelligence. The numbers, reflected in Table 10, in the companies' insights support the postulate of data-driven decision-making being beneficial for business performance.

Table 10. Industrial analytics insights and numbers on benefits of data-driven business (Erie Street, 2022)

Company/ Research body	Insights and Numbers
<i>University of Texas, Austin</i>	A 10% increase in data usability could increase the average Fortune 1000 company's revenue by over \$2 billion
<i>Splunk</i>	Companies who place high emphasis on data see an average annual revenue increase of 5.32% due to better data use
<i>IBM</i>	62% of retailers report gaining a competitive advantage from information and data analytics
<i>Forbes</i>	Data-driven companies are 23 times more likely to acquire customers than their peers
<i>Harvard Business Review</i>	74% of business leaders expect long-term gains in productivity by making data insights available to frontline employees
<i>Deloitte</i>	62% of companies still rely on traditional tools such as spreadsheets for data analytics, despite 76% reporting their analytical maturity has increased over the past year

In addition to content-related insufficiencies, non-data-driven process modeling itself is a time- and resource-consuming task (Indulska *et al.*, 2009). More, “de-jure” processes model is error-prone due to their manual creation. In sum, van der Aalst finds that the currently prevailing approaches of process modeling are “disconnected” from process realities (van der Aalst, 2013), which implies that human-centered non-data-driven approaches provide only an insufficient base for decision-making in BPS.

In 2020, an analytical group (Freeform Dynamics, 2020) published a research report claiming a strong correlation between data-driven business processes and company performance, which is reflected in Figure 13: the better organizations manage and exploit the data available to them, the more they tend to be achieving superior business outcomes.

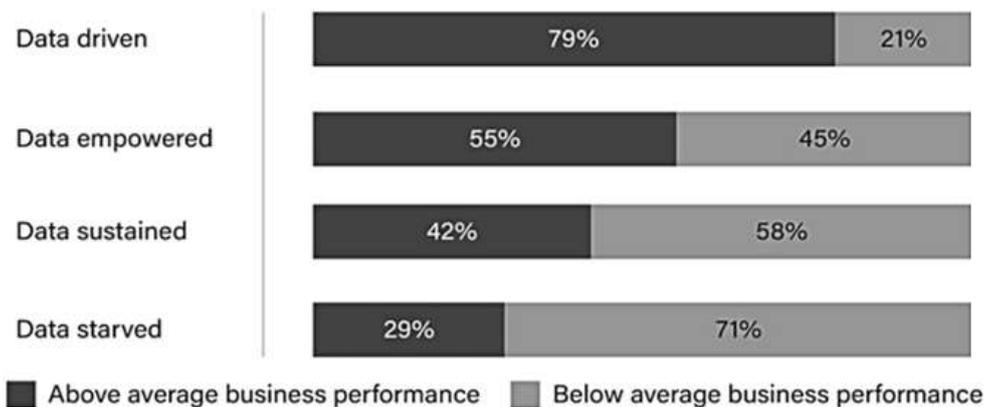


Figure 13. More data-mature organizations achieve superior business outcomes (Freeform Dynamics, 2020)

A chance to overcome these weaknesses of decision-making in process transformation is to utilize the increasing availability of process data from numerous information sources in organizations (Loebbecke and Picot, 2015) to facilitate Decision Support Systems (DSS). For example, application systems store process events in large event log tables (van der Aalst *et*

al., 2007) which provides the possibility to improve decision-making by data-driven approaches such as process mining (van der Aalst, 2014). Thus, data mining delivers descriptive and positive "de-facto" process analyses based on data (van der Aalst, 2014) for DSS. Thus, "de-facto" processes analysis provides an important supplement to BPS decision-making.

Data-driven technologies such as data mining (van der Aalst and Weijters, 2004) provide the potential for data-driven analyses of decision-making (Lederer *et al.*, 2017; van der Aalst, 2018). Although data mining originated several decades ago, the technique still emerges at an unprecedented speed and increasingly gains in popularity in both academia and practice (van der Aalst, 2011). Data mining provides the potential to complement non-data-driven process analyses, and to contribute to the solution of organizational challenges (van der Aalst *et al.*, 2007) such as creating of value proposition. In particular, mining serves as the bridge and the missing link for the gap between traditional, non-data-driven or model-based analysis and decision-making in Business Processes and evolving data-driven techniques such as text-mining (van der Aalst *et al.*, 2007). Thus, data mining can offer an encouraging tool to recover contingency aspects of Business Processes from data in application systems for enriching current non-data-driven decision-makers' knowledge and facilitate Decision Support Systems.

Chapter 2.1. Conclusions:

1. Traditional, non-data-driven approaches to decision-making in creating value proposition, such as offered by Osterwalder and Pigneur (2010), typically follow a data-independent, manual approach involving one or few participants.
2. The non-data-driven traditional tactic suffers from several disadvantages, that limits effectiveness in decision-making: human inputs, biases and subjectivity, prone to errors by human decision-makers, typically be more expensive, time-consuming.
3. Taking advantage of the growing availability of process data from a wide variety of information sources within businesses is an opportunity to address these shortcomings in the decision-making in relation to process transformation.
4. To retrieve contingency factors of Business Processes from data in application systems, data mining offers a promising technique to enrich existing non-data-driven knowledge of decision-makers and facilitate Decision Support Systems.

2.2 Information Extraction from Texts as a Named Entity Recognition Task

To support a business process of delivering new value proposition, this research offers

data-driven approach to identification of values, increasing numbers of values, and automation of the this process.

Value proposition of the company in vast majority of cases is stated in the natural language and contains values delivered by words. Homepages, usually in the format of a landing page, contain factual information, including the value proposition expressed by an unstructured text. the specific features of the value proposition concept and values as its part is discussed in Chapter 1.

From the Natural Language Processing perspective, values in the texts of value propositions can be considered as named entities and be identified using the technique known as Named Entity Recognition.

Thus, the task of this research becomes transforming the natural language of value proposition into a database that can be measured and evaluated. The early domain-specific systems (such as for baseball facts, data about rocks, or medical concepts) used such knowledge bases as context for data mining.

The task of transforming a natural language into a structured database is referred to as semantic parsing. (Kočíský, 2017) claims that semantic parsing is a well-studied problem with numerous approaches including inductive logic programming (Zelle and Mooney, 1996), string-to-tree (Galley et al., 2004) and string-to-graph (Jones et al., 2012) transducers, grammar induction (Reddy et al., 2014) or machine translation (Andreas et al., 2013). Other approaches, for example, focus on learning from question-answer pairs and avoid the need for annotated logical forms (Berant et al., 2013; Bordes et al., 2015, i.a.). According to (Kočíský, 2017), the tasks often come with only small training sets which makes the problem especially challenging for deep learning methods. The success of deep learning methods for text mining is relatively recent (Dong and Lapata, 2016; Jia and Liang, 2016; Bordes et al., 2015).

2.3 Information Extraction

With the explosive growth of the World Wide Web, admits (Chen, 2014), there is a vast wealth of information in semi-structured and unstructured documents (e.g., web pages and full-text documents) available on the Web. Efforts to automatically access and distil the information from these sources have thus been ongoing for the past decade. This area is known as Information Extraction (IE). In contrast to Information Retrieval (IR), whose task is to find out and rank relevant documents according to queries representing a user's information need, a broad goal of IE systems is to extract structured data from semi-structured and/or unstructured

machine-readable documents, where the specific type and structure of the information to be extracted depend on the need of the particular application.

Web IE tools, also referred to as wrapper induction systems, (e.g. Lixto (Baumgartner, 2001), RoadRunner (Crescenzi et al, 2001) and WebTable (WebTable, 2022)) perform IE on semi-structured online documents such as HTML pages, primarily using the layout structure of the documents. In contrast, the IE tasks are those which process free text in natural language, since this “unstructured” data is the primary source of human-generated information (Sarawagi, 2006).

To illustrate the distinction between wrapper-induction based and text-based IE, (Chen, 2014) considers the scenario of extracting relational data from the web sites of real estate agents in London (see Figure 14).

Figure 15 shows the resulting tuples obtained from the web pages by the wrapper Lixto, where each record describes the attributes of an individual property such as address, postcode and price. However, there is a Description field in the form of plain text, which includes additional interesting facts. These facts (e.g., “River Thames” is a river and is close to “Timber Pond Road”), as highlighted in Figure 15, need to be extracted by text-based IE, since a traditional web wrapper is unable to do so.

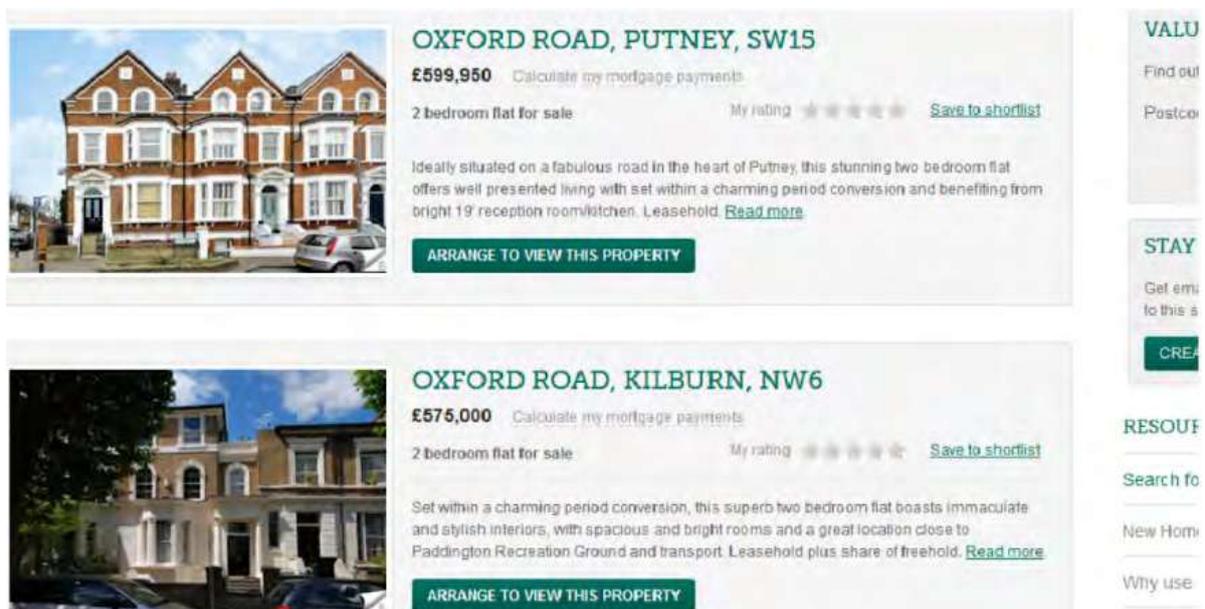
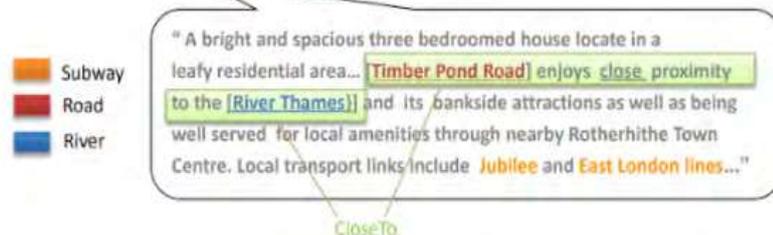


Figure 14. An example of a website of London real estate agent (Chen, 2014)

ID	Address	Postcode	Price	Bedroom	Bathroom	Description	Date
1	Oxford Road, Putney	SW15	£599,950	2	N/A	Ideally situated on a fabulous ...	07/04/2014
2	Timber Pond Road, Rotherhithe	SE16	£375,000	3	N/A	A bright and spacious three house...	08/04/2014
...

(a) Structural data extracted by Lixto



(b) Text IE on the free text content in the column Description

Figure 15. Example result from Web IE and text IE (Chen, 2014)

(Chen, 2014) explains *Semantic annotations* the following way: information extraction on text, as can be seen in the previous example, extracts factual metadata that conveys the information of the original text. The extracted metadata is assigned to the text, presenting part of the text information content for further processing. This task was initially explored by the Natural Language Processing (NLP) community, and now has been extensively studied in research communities including text and web mining. IE has a wide range of applications in domains such as biomedical informatics (Gaizauskas, 2003), business intelligence in finance and E-commerce (Malik et al., 2011; Hu and Liu, 2004), serving as a bridge between raw data and knowledge. For example, the output from the following text analysis tasks with different purposes are all considered as semantic annotations:

- *Named entity extraction*: recognize and classify atomic snippets in text as referring to particular semantic categories (e.g., Person and Company) (Cunningham, 2002). In some cases, it also involves a subtask named entity disambiguation, which resolves entity identifiers of the entity instance detected (Li et al, 2013):

- *Relation extraction*: extract relationships between entities (Reichartz et al, 2010);
- *Sentiment annotation*: identify viewpoints or emotions in the underlying text. The attitude or tone can be polarity opinions such as Positive/Negative or comparison opinions such as Better/Worse or simply Subjective/objective (Ganapathibhotla and Liu, 2008);
- *Topic annotation*: attach documents with topics or themes (Silva et al, 2001);
- *Co-reference annotation*: catch co-referring mentions of a given entity (Deemter and

Kibble, 1995);

- *Keyword annotation*: extract relevant keywords or terminology to the content the text (Liu et al., 2009).

(Chen, 2014) continues that although there are different IE tasks, there is one fundamental research topic - *Named Entity Extraction*, which by far is the most crucial and mature task. NER has been involved in many applications in addition to being a built-in component for IE. In question answering (Srihari and Li, 2000), for example, candidate answer strings are often named entities that must be detected and classified in advance. In entity-oriented search (Cheng, 2007; Hu et al, 2006), identifying named entities in documents as well as in queries is the first step towards obtaining high relevance of search results.

The development of IE has close relations with benchmarks including the Message Understanding Conference (MUC) (Muc7, 2014), the Conference on Natural Language Learning, CoNLL (Sang and Meulder, 2003), and the Automatic Content Extraction (ACE) program (Doddington, 2004). They focus on different IE tasks. For example, ACE focuses on entity, relation and event extraction while CoNLL simply works on entity extraction. 1.1.2 Approaches to semantic annotation. A conventional IE system works as a pipeline which is composed of a number of NLP components, such as lexical processing (e.g. tokenization) and syntactic analysis (e.g. Part-of-Speech tagging). Each analysis pipes the output to the next analysis stage which will be consumed as base features.

The core upper-layer analysis of NER can be divided into three major categories according to (Chen, 2014): hard-coded methods, machine learning methods and hybrid methods:

Hard-coded methods

- *Gazetteer annotators*. These annotators annotate an arbitrary text string by simply finding a match from gazetteers or dictionaries, where the gazetteers are maintained as a set of static files with lists of NE instances (Smith and Osborne, 2006). The matching process can be implemented by methods such as hash-based matching and finite state machines.

In particular, gazetteer annotators manifest their superiority when dealing with some “rare” and static concepts such as Country and Holiday. However, gazetteer annotators suffer from several inherent limitations:(i) it is time-consuming to manually enumerate entity items for large volumes of lists; (ii) it can be an issue for precision because utilizing a dictionary intuitively can force the recognition of certain strings to be specific NEs regardless of the ambiguity of the text to be annotated (e.g., “Nottingham” can be a City or a SportTeam); (iii)

it can also be problematic for the recall of those NE types which cover a broader domain of instances (e.g., names of people who are not celebrities).

- **Regular expression annotators.** These annotators apply regular expressions to capture the patterns of character strings. Thus, they are particularly useful if those entities instances share a common pattern, such as well-formed email addresses, phone numbers and URLs.

- **Complex rule-based annotators.** Such annotators consist of a set of more complex hand-crafted rules such as GATE (Cunningham, 2002). It composes annotations based on those base annotations produced by low layer extractors. The composition rules implicitly construct a “bottom-up” hierarchy among annotators. Composed annotators consume the text along with the annotations attached by base annotators.

Machine learning methods

More recent work on NER uses statistical machine learning methods, which have become a popular alternative due to their capability to automatically infer patterns hidden behind large volumes of data. They can further be categorized into supervised, semi-supervised and unsupervised.

- *Supervised annotators.* These approaches address the NER problem by learning disambiguation rules from labelled examples based on discriminative features (e.g. the linguistic analysing result from the IE pipeline). Hidden Markov models (HMM) are an early attempt to address NER (Zhou and Su, 2002). Other well-known learning models such as Maximum Entropy models (Chieu and Ng, 2003), Maximum Entropy Markov models (McCallum et al, 2000; Curran and Clark, 2003), Support Vector Machines (Duong et al, 2006) and Conditional Random Fields (Lafferty et al, 2001) have also been widely applied as NER solutions. Supervised methods can work well when the training data is plentiful and easy to create. In addition, they are more likely to capture complex patterns which may be difficult to observe or difficult to encode with hand-crafted rules. Nevertheless, one major disadvantage is the reliance on human annotation of a training set, especially when porting the system to a new domain.

- *Unsupervised annotators.* For these annotators:(i) the vocabulary of target NE types (or favoured predicates) can either be input by users (as in Etzioni et al, 2004) or taken from external resources. For example, (Alfonseca and Manandhar, 2002) makes use of the ontology of WordNet (Miller, 1995); (ii) with regard to the NE identification process, one common way is to obtain “supervision” from some external sources. For example, a corpus can be retrieved by applying keyword queries to search engines. Keywords can be determined by heuristic

patterns or terms from a synset in WordNet, etc., where a synset is a set of synonyms for a concept. Unsupervised methods save the cost of labelling large amounts of training data. However, they rely on external resources which may not be so “well-tailored” to support the learning process. This tends to make these approaches lose accuracy.

Hybrid methods

The goal of hybrid-based methods is to combine both handcrafted based and ML-based methods. (Srihari and Li, 2000) first built a NER model which incorporates rule-based methods, HMMs and Maximum Entropy methods. (Wu et al, 2003; Florian et al., 2003) combine several comparatively strong individual ML-based classifiers such as a bootstrapping-based approach and SVM in different ways. For example, they train multiple classifiers sequentially by making each successive classifier consume the results of the previous one, taking advantage of the strongest point of each method.

In addition to these prevalent methods, alternative solutions are emerging and contribute to modern IE. Efforts on investigating Semantic Web-driven (or Knowledge driven) approaches (Ciravegna and Lavelli, 2004; Cimiano et al, 2004; Kiryakov et al, 2004) recently have been made by the inter-domain collaboration of researchers from the fields of IE and Semantic Web who turn their attention towards how Semantic Web technologies can benefit the traditional IE community. On the one hand, IE helps to mine knowledge from the text that enriches domain-specific repositories. On the other hand, the Semantic Web community makes these resources available, e.g., through Linked Open Data cloud (LOD) (Linked Open Data, 2022), which are ready to be utilized for IE. LOD describes a method to publish and share structured data and interlinks the data from different sources (Linked Open Data, 2022). In general, these approaches use unstructured, i.e., gazetted, or structured, i.e., ontological, background knowledge to locate the entities of interest in a text document (Chen, 2014). In detail, ontologies can be used to:(i) drive the construction of meaningful linguistic patterns, as in (Ciravegna and Lavelli, 2004; Karkaletsis et al, 2004; Ma and Shepherd, 2004); (ii) refine the extraction rules, as in (Cimiano et al, 2004; Basili, 2003), or (iii) logically validate the result of the extraction, as in (Buitelaar and Siegel, 2006; Maedche et al., 2003) or, simply, (iv) link the extracted entities to a reference ontology, as in (Mendes et al., 2011; Kiryakov et al, 2004).

2.4 Related Work on Named Entity Recognition

This research proposes a novel task of value identification in the frame of Value Proposition as a part of the existing techniques of Named Entity Recognition (NER), where the

word or a phrase expressing value is treated as a Named Entity.

The main area of the information extraction technique described in this chapter is NER and the most relevant related works are summarized in this section.

(Ortona, 2016) concludes that three groups of studies on Named Entity Recognition could be determined at present, based on the information source which is leveraged for producing text annotation:

Language-driven approach presents traditions in Named Entity Recognition. It exploits knowledge of natural languages to obtain linguistic pattern normally forming the rules which, when applying to texts, retrieve instances of the entities of interests. A notable system in this sense is KnowItAll (Etzioni et al., 2004), that uses eight pre-defined extraction patterns to generate candidates for extraction that are then statistically validated over a corpus. The extraction patterns in this work are manually defined. Pre-defined linguistic patterns work well on edited text documents, such as journal articles and books, where the sentences are well structured, but are less effective on irregular documents, e.g., classifieds and tweets, where the sentences are poorly structured. Self-supervised learning approaches have therefore been proposed that use additional information such as POS-tagging (Part of Speech) labels to identify the most likely candidate for the extraction. This can be done, e.g., by training a suitable classifier as in TextRunner (Banko et al., 2007). TextRunner, despite leveraging on a machine learning algorithm, cannot be classified as a supervised method, since positive and negative examples are automatically generated via obvious candidate entities;

Knowledge-driven approach utilizes structured, i.e., ontological or unstructured, i.e., gazetted, background information locating an entity of interest in the text documents. Numerous research efforts have tried to leverage on an external background ontology, usually referred to such approaches as ontology-based information extraction (OBIE). Ontologies can be used to: (i) drive the construction of meaningful linguistic patterns as in LearningPinocchio (Ciravegna and Lavelli, 2004), CROSSMARC (Karkaletsis et al, 2004), and 2PP (Ma and Shepherd, 2004); (ii) refine the extraction rules as in PANKOW (Cimiano et al, 2004) and NAMIC (Basili et al., 2003), or (iii) logically validate the result of the extraction as in SOBA (Buitelaar et al., 2006; Maedche et. al., 2003) or (iv) link the extracted entities to a reference ontology as in DBpediaSpotlight (Mendes et al., 2011) and KIM (Kiryakov et al., 2004). As the last group of NER systems, most commercial entity extraction tools are data-driven, i.e., they replace sophisticated annotation techniques and background knowledge with very large amounts of data (usually from the web) and relatively straight forward machine learning

techniques. These systems obtain relatively high accuracy in an open domain by restricting the type of entities to be extracted, e.g., to persons and organisations. Notable representatives of this class of systems are AlchemyAPI, CiceroLite, OpenCalais, and Zemanta. The main problem with these tools is their poor performance on documents that do not belong to the training domain;

Combining annotators. Usually approaches that tackle the aggregation of multiple NER systems have exploited voting mechanism or variations of it (Kozareva, 2007). As also noticed in (Si et al., 2005), a voting-based aggregation is heavily biased by types and numbers of annotators. Particularly, voting mechanisms do not work well with web-based annotators, since the performance of concepts claiming to be recognized is very limited and this obviously affects the quality of the outcome, especially when it is not assumed any prior knowledge about individual systems. In (Si et al, 2005) the weights are computed applying an exponential model inspired by meta-informational retrieval systems (Aslam and Montague, 2001). The main difficulty of this model lies in weights defined by a per-annotator base, with no taking into account the performance of an individual annotator on different concepts. Alternative simple voting mechanisms are also often complemented with thresholding (Kambhatla, 2006), that outputs annotations only if they exceed a minimal support. Annotators have very different vocabulary coverage, and here exist entities which could be properly identified using a single system. As a matter of fact, 8 (out of 11) of the evaluated systems contain at least one concept that is not identified by any of the other systems. Thresholding on support would result in a substantially recall drop. Take as instance the concept CommercialOrg, identified only by CiceroLite. This concept has at least one instance in each of the document of the corpora, and using an arbitrary threshold on it would decrease the overall accuracy of about 20%. Repair-based approach, in contrast, is not limited by any arbitrary threshold. Machine learning techniques is a straightforward way of combining annotators, especially to determine the optimal combination of annotators with respect to their accuracy. Among others, the most popular techniques are conditional random fields (CRFs) (Si et al, 2005), classifier stacking (Florian et al., 2003; Wang and Zhao, 2008; Wu et al., 2003), support vector machines (Duong et al., 2006) and neural networks (Speck and Ngomo, 2014). All those approaches are based on the principle that combines classifiers to achieve a general truth-finding model. No single approach of the listed utilizes ontological knowledge determining logical conflicts, which aggregation causes.

As general, those techniques frequently do not pay attention to certain information

regarding text semantics or contexts. An approach, namely Nerd (Nerd, 2022), proved that ontological background knowledge - this managed to be useful with creating annotations - could as well be helpful with aggregation of numerous annotators, logically specifying incoherent annotations. Though, Nerd ontology contains no disjoint restrictions and consequently they must use a different way to automatically detect conflicts. Nerd adopts machine learning to integrate (Erp, 2013), however such techniques are not explained in the documentation when invoking its web service. Many different options for both Conditional random fields (CRF) and Maximal Entropy Markov models (Kakade et al, 2002). (Florian et al., 2003) reported experiments on the Reuters corpus with F-scores, their system won a CoNLL competition. (Michelakis et. al., 2009) analyzed the mixture rule-based annotations used by annotators. It uses a maximum entropy classifier, "but with evidence vectors being the output of rule-based annotators"; most of the traditional aggregation methods use techniques that exploit how individual experts reach a conclusion, thus treating experts as transparent "white-boxes" (Ortona, 2016).

Another complementary body of works studies how to detect and repair inconsistent facts in automatically created ontology, e.g., YAGO (Suchanek et al., 2008). SOFIE (Suchanek et al., 2009) uses common-knowledge rules to detect, delete or repair logically inconsistent facts. As mentioned above, these techniques can be incorporated in repair approach when additional knowledge about annotators is available. In Figure 17, rules could be used there to restrict the combination of valid concepts that appear in annotations. For instance, the names of museums typically contain names of countries/cities where they are situated, and people citations may contain the position/title of the person.

2.5 Value Entity Recognition (VER)

Typically, named entities are a type of proper names while others are general entities within the domain. Thus, NER is processed based on orthographic features, word-level features, and gazetteers (Ngo, 2021). To classify named entity tags and the disambiguation among named entities based on their features, data analytic techniques are used. However, these features have very little contribution to the Value Entity Recognition (VER) task because, as (Ngo, 2021) showed based on the Agricultural Entity Recognition (AGER), general entities are not proper names and they do not have orthographic features like named entities in the NER task. For entity recognition systems, it is a challenge.

This dissertation proposes an entity recognition process in a specific domain which is

air transport, and the entity is a value as a part of value proposition. The key highlights of the VER are: (1) design rule-based annotation experiment for value entities; (2) create a semantic-based Value Entity Recognition (VER) task and a original effective approach for VER in air transport domain; (3) utilize deep learning (DNN) to train and identify value entities from texts of air transportation Twitter profiles of start-up companies. The semantic-based VER approach combines a NER-based approach and binary classification approach (if an entity is a value or is not a value). Figure 16 shows the place of Value Entity Recognition (VER) as an NER approach to Information Extraction Process (adopted from Alexander, 2013).

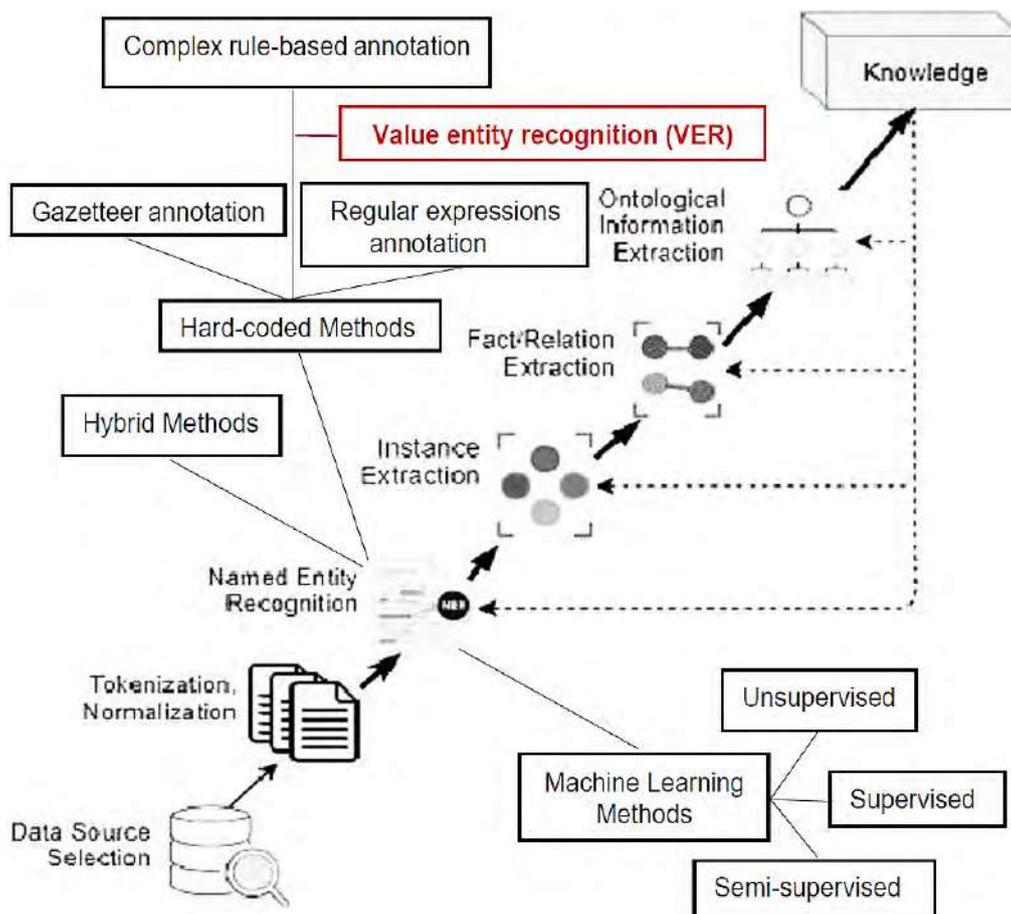


Figure 16. Value Entity Recognition (VER) as an NER approach to Information Extraction Process (based on Alexander, 2013)

Determining the methods of identifying values from texts, several alternatives were evaluated as reflected in Table 11.

Table 11. Alternative methods for value identification from texts

Method of Information Extraction	Reason for Accepting / Rejecting
1. Multiclass (speed, cost, comfort), predetermined classes	1. numerous classes and no opportunity to find new classes/values
2. sentiment analysis	2. whole text/sentence is evaluated; multiclass (values can belong to a mixture of sentiment classes)
3. binary term classification	3. allows to identify new values
4. Named Entity Recognition (NER)	4. allows to create a new entity for recognition

NER approach allows to create *a new entity* type - *value* with predefined semantic rules for annotators: they learn a basic theory of a value proposition and they are trained to spend the same time as an average online consumer spends on a webpage - 62 seconds (Contentsquare Homepage, 2020).

In the example on Figure 17, named entities are represented as predefined classes: person, location, facility. Those classes possess orthographic features, word-level features, and gazetteers, which allow to tag them. Value Entity Recognition is a novel task with no corpora or dictionaries, no orthographic or level features, and it is the reason this task requires semantic approach.

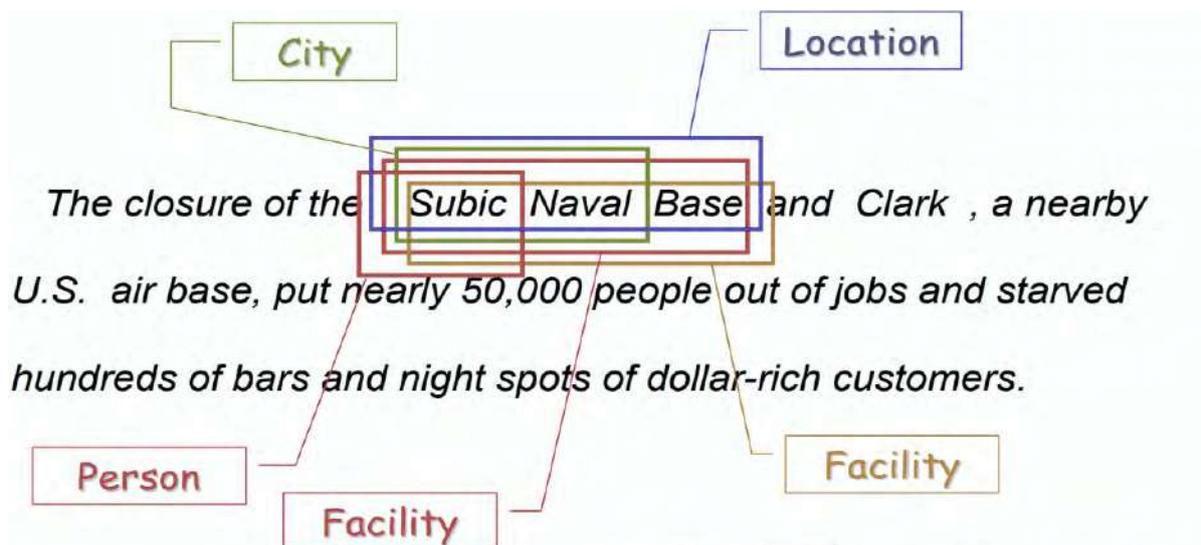


Figure 17. Named Entities tags in the sentence (Chen, 2014)

2.6 Related Work on Analysis of English Language in Air Transportation

Given the size and global reach of the industry, research into air transport language, especially regarding the increasing shift to English-language interactions, is still relatively small. This is surprising and perhaps even concerning. However, over the last two decades, many linguists have worked with aviation experts, as well as educational programs and universities around the world, to gather data and analyze needs and possibilities for effectively meeting those needs.

The aim of the chapter is twofold: 1) to update the bibliography of research papers on the topic of Air Transport English; 2) to explore relevant research changes related to the topic of Air Transport English and reflected in the existing bibliography.

Papers on aviation communication have been presented at large scientific conferences such as the American Association for Applied Linguistics (AAAL), (AAAL, 2021) meeting,

held every year in the United States (or Canada), or the TESOL convention (TESOL, 2021), also based in the United States. Papers on the assessment, evaluation, and discourse analytic analysis of aviation language have been presented at more specialized conferences and colloquia, such as the Language Testing Research Colloquium (LTRC, 2021) organized by the International Language Testing Association (ILTA) or the American Association for Corpus Linguistics (AAAL) meeting. A colloquium on "Testing Aviation English" was held at LTRC 2010, and a panel on "Language Tests and Language Policy: The Case of Aviation English" was hosted at AAAL 2012.

The presented bibliography research was developed from "Language and communication in aviation: an annotated research bibliography" (Friginal, Mathews and Roberts, 2019) covering 2002 - 2016 related research.

This thesis utilized the term *Air Transport, Air Transportation, Aviation* (see Context of Terms). The bibliography of related works (Friginal, Mathews and Roberts, 2019) that is used and updated in this thesis adopts the term *Aviation (English)*, framing the same industry of civil aviation and excluding military aviation according to the (ICAO, 2009) working paper "Review of the classification and definitions used for civil aviation activities". Figure 10 offers the Proposed ICAO Classification of Civil Aviation Activities.

The authors of "Language and communication in aviation: an annotated research bibliography" (Friginal, Mathews and Roberts, 2019) obtained 9 citations according to Google Scholar as of June 1, 2022.

To update the bibliography of Aviation English, the selected most prominent papers reflecting the development of Aviation English and its dominant research areas were chosen. To identify changes and prominent aspects of Aviation English studies, a semantic analysis of the papers' keywords and abstracts was implemented. The research also offers insights into the impact of Aviation industry liberalization in the early 2000s on the research focus of Aviation English.

Exploring the role and usage of English in aviation, it is important to understand that Aviation English (AE) is influenced by a large number of regulations, guidelines and standards. The formalization of Aviation English came both from technical English, traditional for the description of the technologies and mechanisms, and as the direct instructions of international aviation organizations - International Aviation Trade Association (IATA, 2021) and International Civil Aviation Organization (ICAO, 2021).

Organizations, researchers and practitioners using non-standard terminology have a

chance to be misunderstood by stakeholders, vaguely identify their statements and potentially lose communication; language-proficient aircraft maintainers can understand and follow aircraft maintenance manuals written in English (Latitude Aero, 2021); furthermore, the language strategy must fit with organization's value proposition to customers to penetrate various markets and coordinate among them (Neeley and Kaplan, 2014).

To accomplish the goal, the author provides an updated bibliography of 2002-2021 studies on the English language and communication in aviation. The research deals with the articles focused on Aviation English across the main scholarly databases Web of Science and Scopus. The selected most prominent papers reflect the development of Aviation English and its most dominant research areas. The research papers were selected with a Hirsch index of at least 4 for at least one author according to the Semantic Scholar rating. Publishing journal's impact factor was also taken into consideration. To identify changes and noticeable aspects of Aviation English studies, a semantic analysis of the papers' keywords and abstracts was implemented.

It should be mentioned that Aviation English is a specialized domain that limits amount of research. Even broadening the domain to non-technical aviation papers (those domains came in focus of Aviation English researchers just recently) including linguistics, management, and marketing gives the picture of a limited number of research. In July 2021, a highly reputable Journal of Air Transport Management published a paper "Innovation and value creation in the context of aviation: a Systematic Literature Review" covering a period of 1999-2018 and reviewing 57 selected peer-reviewed publications (Pereira, 2021).

This chapter also offers some insights into the impact of Aviation industry liberalization in the early 2000s on the research focus of Aviation English in the subchapter about English in a Historical Aviation Perspective.

The idea of Aviation English research was founded not out of the scientific curiosity. As the communication in this highly restricted due to its air-located nature industry is conducted in English, the quality of English language, the absence of the ambiguity of the terms, correct expectations of the industry practitioners play one of the major roles of the security of flights.

2.6.1 *Papers Selection Methodology*

This paper adapted the framework of the six steps developed by Durach et al. (2017) based on the previous outlines by Campbell's Steering Collaboration Group (2017), Tranfield

et al. (2003) and Mulrow (1987). Figure 18 shows six steps with obtained numbers of papers.

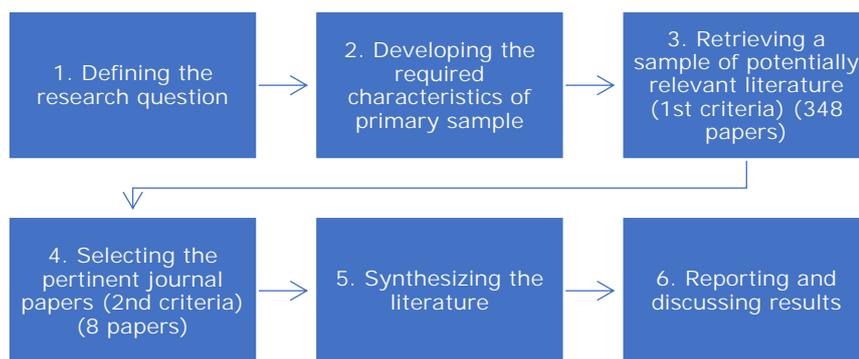


Figure 18. Research framework (adapted from Durach et al., 2017)

The first step indicates an initial research question with the intention to contribute to the literature that investigates Aviation English. The second step elaborates the prime requirements for the observed sample of papers. Papers were searched in Web of Science and Scopus data bases. Keywords were determined and applied to the titles, papers’ keywords and abstracts: “airport OR airline OR aviation OR air transportation OR air transport” and “linguistics OR language”. Third step operationally selected papers in English and about English language. Also, at this step research papers were selected with a Hirsch index of at least four for at least one author according to the Semantic Scholar rating as reflected in Table 12. This search returns 348 papers.

Table 12. Hirsch index as an author-level metric

	2021	2020	2018	2017
Author/	S.Ruangjaroon 4	Bo Li 14	S.Katsumata 4	A.Borowska 4
Hirsch	R.Yeniterzi 10	E.Park 23		
index		W.Messner 8		
		N.Rubens 19		

Step 4 operationally applied more criteria and hand selection of relevant papers. The specific application involved the determination of the articles’ main scope - aviation English language. The main goal of the selected papers required the analysis of English language used in air transportation including air traffic, airport management, etc. This concept should be clearly defined in the abstract and introduction part of papers. After applying the above-mentioned criteria, the final sample offered 8 papers for analysis.

The selected papers were organized in the spreadsheet (year of publication, journal, keywords, shortened abstract) and a semantic analysis was applied to identify the domain and domain change trends from 2002 to 2021.

2.6.2 *English In a Historical Aviation Perspective*

It is no overstatement to define aviation to be the most universal of all industries. From the extent of long-term strategic planning to daily critical organizational and safety requirements, no other sector is as reliant on international collaboration and intercultural connectivity as global civil aviation. It is believed that one can board an airplane in one place, fly safely across a continent, across multiple time zones and the airspace of several states, and land in another country in a few reasonably comfortable hours. Travelers do so because they know that the companies that produce airplanes conform to strict engineering and design requirements. Air travelers have a right to expect commercial aircraft to be well-maintained and clean. They are aware that pilots are well-trained and must complete more rigorous training than any other careers. It is generally assumed that pilots comprehend and receive reliable weather information in a timely manner.

While many people are unaware that modern airplanes have numerous warning systems that alert the pilot when the plane is flying too close to a mountain, the ground, or another plane, learning about them makes one feel safer as a traveler. Travelers do not think much about the men and women who work in airport towers and air traffic centers around the world and who efficiently track and safely separate aircraft in their airspace, if the pilot does not inform them that the plane is in a hold of air traffic control. When an incident occurs - and incidents in commercial aviation are rare, considering the media coverage - society admires the search and rescue personnel who first attempt to save lives before going to extraordinary lengths to retrieve the bodies of those who died so that their loved ones will have closure. Most significantly, society is thankful for an autonomous, impartial accident investigation agency whose mission is to uncover all potential causes that led to the accident so that commercial aviation can continue to be healthy for the general public. Commercial aviation's high degree of safety and performance, which is taken for granted, is attributable in large part to an extended collection of international regulations to which almost all countries have voluntarily subscribed and which they have incorporated into their own national regulations. The guidance documents, recommended practices, and standards produced, written, and maintained by ICAO are these regulations and specifications.

The International Civil Aviation Organization (ICAO, 2021) is a United Nations specialized agency tasked with supporting the growth of international civil aviation around the world. The International Civil Aviation Organization (ICAO, 1944) was established in 1944 when the US government invited representatives from fifty-four countries to a conference in

Chicago, Illinois, to plan air routes and services and collect data to direct the growth of international aviation (Mackenzie, 2010). On December 7, 1944, the ICAO Convention on International Civil Aviation, also known as "Chicago Convention," was signed (ICAO, 1944).

The need for nations' collaboration became evident early in the history of powered flight. And as early as 1910, the fledgling international aviation community understood that efforts on both sides of the Atlantic would require international cooperation. France organized the first aviation conference in Paris in 1910 (ICAO, 1944), and the first Pan-American Aeronautics conference was held in Santiago, Chile, in 1916 (ICAO, 2018).

The League of Nations held a convention in Paris in 1919, less than twenty years after the first flight, at which the Convention Relating to the Regulation of Aerial Navigation was adopted (ICAO, 2018). The Paris Convention also established the International Commission for Air Navigation (ICAN), which regulated international aviation before the Chicago Convention was adopted (ICAO, 2018). Lufthansa began commercial transatlantic passenger flights between Berlin and Brooklyn, New York, in 1938 (Dienel and Schiefelbusch, 2000). The Assembly and the Council, which involves a working secretariat and a technical advisory body (the Air Navigation Commission (ANC)), are the two governing bodies of ICAO (Nations' encyclopedia, 2017).

In reaction to the number of aviation incidents in which insufficient English language proficiency was identified as a contributing or latent cause, India introduced ICAO Assembly Resolution A32-16: to ensure that pilots and air traffic controllers can perform and understand radiotelephone communications in English, "ICAO Assembly Resolution A32-16", 1998 (ICAO, 1998). "The Council is requested to direct the Air Navigation Commission to give this matter high priority," according to Resolution A-32-16. The full range of organizational situations in which aviation staff must communicate in English involves reading, speaking, and listening. Nowadays, English is found in many, if not all, aircraft operating manuals, in-flight checklists, and Quick Reference Handbooks.

2.6.3 *English as the Official Language of Aviation*

In 2001, ICAO Member States and aviation industry organizations with official representation at ICAO were encouraged to provide the aviation operational and applied linguistics specialists to take part in the research of the study group, dubbed the Proficiency Requirements in Common English Study Group (PRICESG), in compliance with standard ICAO procedures for the establishment of study groups (Knoch, 2009). Pilots, air traffic

controllers, civil aviation officials, and applied linguists with international experience from these organizations, as well as from a geographically diverse community of Member States, took part (Doc. 9835, paragraph 1.4.2) (ICAO, 2004). The study group was led by ICAO Technical Officers from the ICAO Secretariat Air Traffic Management Bureau and assisted by an ICAO-hired linguistic consultant. The PRICESG work outcome lead from Council adopted Amendments to Annex 1 about the language proficiency in international civil aviation. Amendments to Annex 6, 10, 11 and PANS-ATM were adopted simultaneously (ICAO, 2004).

ICAO’s Secretary General approved the first edition of the ICAO Doc 9835 - Manual on the Implementation of ICAO Language Proficiency Requirements on September 2004 (ICAO, 2004). With the support of the PRICESG, ICAO would need to accomplish the goal to develop a global language policy that would apply to all Member States in equal measure. Each Member State had to implement the developed language requirements.

Aviation operational staff of ICAO member states needs to be able to understand and enforce the only policy. As a result, English has obtained the official status of the Language of Aviation. In Table 13, the author presents a summary list of current ICAO language directives.

Table 13. Summary list of recent ICAO Language Directives

ICAO Language Directive	Title	Year
1. ICAO 295 LAN TST (EALTS, 2020)	English for Aviation Language Testing System (EALTS) Handbook	2019-2020
2. Resolution A38/8 (ICAO, 2013)	Proficiency in the English language used for radiotelephony communications	2013
3. ICAO Doc 9835 (Document 9835, 2010)	Manual on the Implementation of ICAO Language Proficiency Requirements (2nd ed.)	2010
4. ICAO Cir323 AN/185 (ICAO, 2009)	Guidelines for Aviation English Training Programmes	2009
5. ICAO Cir 318-AN180 (ICAO, 2008)	Global Harmonisation Testing Criteria	2008
6. ICAO Doc 4444 (Doc 4444, 2007)	Air Traffic Management	2007
7. ICAO Doc 9432 (Doc 9432, 2007)	Manual of Radiotelephony (4th ed.)	2007

The ICAO language proficiency requirements introduce into the aviation industry a great need for specialized expertise of applied linguists. The need for more and better aviation English analytical materials, targeting a wider audience, to include aviation managers, marketers, policy makers and maintenance technicians does not stand to diminish but rather to increase concurrent with the development of the industry.

2.6.4 Aviation English Bibliography Update

A bibliography of language research in Aviation English from 2017 to 2021 is presented

in Appendix I. This table provides bibliographic citations of the papers, primary foci from the abstracts and keywords. The presented bibliography research was developed from “Language and communication in aviation: an annotated research bibliography” (Friginal, Mathews and Roberts, 2019) covering 2002 - 2016 related research. “Language and communication in aviation: an annotated research bibliography” (Friginal, Mathews and Roberts, 2019) obtained 9 citations according to Google Scholar as of August 1, 2021.

The bibliography reflects the fields of conducted research, the dynamics of research domain canes. It can be concluded that no research is dedicated to the value proposition in Aviation English, nor any research proposes a text-mining methodology for data-driven Decision Support System.

2.6.5 *Changes in Aviation English Research Domains*

To evaluate the recent related research focus shift, the analysis of research domain changes was performed.

Indicating the changes in the domains of Aviation English research throughout the first two decades of the 21st century, two tables were developed. They are based on the semantic analysis of keywords and research abstracts.

Table 14 indicates the year and keywords from 2017-2021 research years.

Table 14. Keywords 2017-2021 (Source: the authors' construction)

Year	Keywords (2017-2021)
2021	Corpus linguistics, hospitality word list, tourism business word list, hotel business word list, airline business word list (Laosrirattanachai and Ruangjaroon, 2021).
2021	Sentiment analysis, Deep learning, Airport service quality, ASQ, Twitter (Barakat, Yeniterzi and Martin-Domingo, 2021)
2020	Limited interval-valued probabilistic linguistic term sets; possibility degree; PROMETHEE II; multi-criteria group decision making; airline service quality evaluation (Bo Li, Yixin Zhang and Zeshui Xu, 2020)
2020	Return visit, Machine learning, Review comment, Airline service (Hwang, Kim, Park and Kwon, 2020)
2020	Airline industry; customer service and satisfaction; English language proficiency; linguistic alignment (Messner, 2020)
2020	Value proposition; air transportation, taxonomy, semantics (Rubens, Zervina, Pavlyuk and Stukalina, 2020)
2018	Airport service, reviews, dictionary, sentiment analysis (Mizufune and Katsumata, 2018)
2017	Aviation English, Applied Linguistics, Discourse Analysis (Borowska, 2017)

Table 15 specifies keywords from 2002 to 2016 research years.

Table 15. Keywords 2002-2016 (Source: the authors' construction)

Year	Keywords (2002-2016)
2016	Aviation language; document classification; NLP; safety reports; text mining (Tanguy, Tulechki, Urieli, Hermann and Raynal, 2016)
2014	Mediated environment; human factors; silence and voice awareness (Katerinakis, 2014)
2014	Discursive psychology; flight examiners; flight repertoires (Mayin & Roth, 2014)
2013	Air medical communication errors; assurance reports; Clark's communication level hierarchy (Dalto, Weir and Thomas, 2013)
2013	Pilot-flight attendant communication; communication barriers; teamwork; nominal group technique (Ford, 2013)
2013	Radiotelephony; professionalism; conventions; resistance; Korean aviation setting (Kim, 2013)
2012	International language protocol; space language protocol (Ansdell, 2012)
2012	Interoperability; communication; aviation information systems (Comitz, 2012)
2012	Airport ground staff; dialogue analysis; forms and functions of workplace discourse (Cutting, 2012)
2011	Pilot-ATC communication; future research; phraseology (Prinzo, Campbell, Hendrix and Hendrix, 2011)
2010	Aviation language tests; Eurocontrol; test variability; language test validation (Alderson, 2010)
2010	Pilot-flight attendant communication; intracrew communication; post-9/11 environment (Brown and Rantz, 2010)
2010	Air Navigation Commission (ANC); English language proficiency; narrative; focus groups; accented English; phraseology; pronunciation training. Report 2 (Prinzo, Campbell, Hendrix, A.M. and Hendrix, R., 2010)
2010	Pilot-ATC communication; non-native English-speaking ATC; English language proficiency; radiotelephony; technology and aviation. Report 3 (Prinzo, Campbell, Hendrix, A.M. and Hendrix, R., 2010)
2010	Pilot-ATC communication; code-switching; negative effects. Report 4 (Prinzo, Campbell, Hendrix, A.M. and Hendrix, R., 2010)
2010	Pilot-ATC communication; dialect; phraseology; training and instruction; future research. Report 5 (Prinzo, Campbell, Hendrix, A.M. and Hendrix, R., 2010)
2009	Controller-Pilot Data Link Communications (CPDLC); text commands; communications technology (DeMik, 2009)

2008	Pilot-ATC communication; problematic communication (Howard, 2008)
2008	Air traffic control training and administration; ATC communication; communication situations; communication problems. Final Report (Prinzo, Campbell, Hendrix, A.M. and Hendrix, R., 2010)
2007	Pilot-ATC communication; datalink; freeflight; technology and communication (Sharples, Stedmon, Cox, Shuttleworth and Wilson, 2007)
2006	“Aviate-Navigate- Communicate;” auditory input; instruction comprehension (Morris and Leung, 2006)
2004	Pilot-ATC communication; technology-induced delays; audio delay; pilot delay (Bantanen, McCarley and Xu, 2004)
2003	Affect; emotional dynamics; crew dynamics; pilot personality; training; politeness and sociolinguistic features of discourse (Brown and Moren, 2003)
2003	Multi-modal information presentation; visual monitoring; attention; working memory (Helleberg and Wickens, 2003)
2002	ESP for aviation; aviation in Turkey; Airspeak (Sullivan and Girginer, 2002)

Table 16 presents domains of research for 2002-2021 based on the year of publishing.

Table 16. Domains of research 2002-2021 (Source: the authors’ construction)

	Semantic Domain					
	Pilots’ communication	Psychology	Documentation	Linguistics	Technology	Business
Year Table 3	2013	2014	2016	2016	2013	2008
	2013	2014	2013	2012	2010	2013
	2011	2013	2013	2011	2009	2013
	2010	2013	2012	2010	2007	
	2010	2003	2012	2010	2004	
	2010	2003	2010	2009		
	2009		2010	2002		
	2008		2006			
	2008					
	2007					
Year Table 4	2017	2021	2018	2021	2021	2021
		2017		2021	2021	2021
				2020	2020	2020
				2020		2020
				2020		2020
				2018		2020
				2017		2018

Semantic analysis of keywords shows changes in the focus of research on Aviation English for domains in 2002-2016 and 2017-2021 (Figure 19).

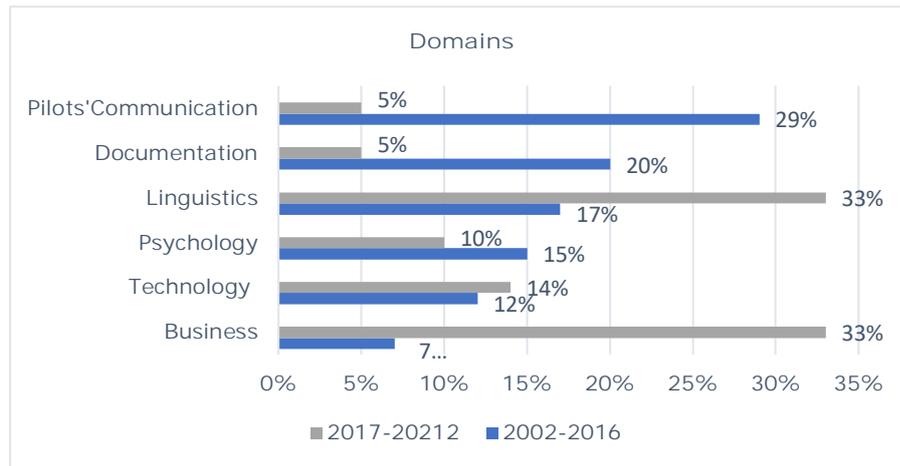


Figure 19. Domains 2002-2016 and 2017-2021 (Source: the authors' construction)

2.6.6 *Impact of Aviation industry liberalization in the early 2000s on the research focus of Aviation English*

In 2002 - 2016, most of the research on Aviation English was conducted in pilots' communication domain - 29%. 20% of papers discuss documentation in English for air transportation. 17% of researchers analysed linguistics and 15% was interested in psychology. Business issues were examined in 7% of research papers only.

The 2017-2021 period shows much more attention to business matters and linguistic aspects of aviation English - both domains gain 33% of all the research. Pilot communication creates 5% compared to 29% from the previous period. Attention towards psychology and documentation has also decreased: 15% and 20% versus 10% and 5% correspondingly. Interest for technology experienced a slight increase from 12% to 14%.

“Aviation English” is a term that is commonly used, but the detailed view shows different domains united under this term. A Google request returns 400 million results. And communication between Air Traffic Controllers (ATCs) and pilots is the aeronautical radiotelephony communication (RT) domain has been recently referred as the only area of Aviation English usage. Today, the situation has changed.

The potential explanation of this could be the following: in 2004, the first edition of ICAO Language Proficiency Requirements (LPRs) claimed that “the sole object of ICAO language proficiency requirements is aeronautical radiotelephony communications, a specialized subcategory of aviation language corresponding to a limited portion of the language uses of only two aviation professions — controllers and flight crews” (ICAO, 2004). This predetermined the initial interest of researchers in communication between pilots and ground crews.

New research objectives were initiated in the recent decades by commercialization of air transportation competition. The Chicago Convention on International Civil Aviation, adopted in 1944, introduced the bilateral frameworks of air services agreements (ASAs) between governments that have regulated international air travel ever since (ICAO Appendix 5, 2021). National airlines serving routes from each region, airlines charging similar fares, and airlines sharing markets and revenues defined the international air transport market that grew. Airports were also operated by the government.

The international airline industry's regulatory structure has been characterized by gradual deregulation of airline markets since the late 1970s. This pattern started in 1978, when the domestic market in the United States was deregulated (ICAO Appendix 5, 2021). In the 1980s, the United Kingdom, Canada, Australia and New Zealand followed the trend, culminating in the European Union's complete legalization of airlines in April 1997 (Bieger and Wittmer, 2016). As a result, airlines have greater flexibility in how they distribute their capital, both in terms of space and time. The global air transport system has become much more competitive and dynamic as a result of deregulation (Lumbroso, 2019), though airports have not been liberalized to the same extent as airlines.

In the early 2000s, research keywords still reflected the regulation of the aviation industry, and its main concern was about official communication between pilots and controllers. Starting from the middle 2010s focus was moving from research of purely operational flight communications to the use of Aviation English as the language of a whole group of aviation professionals. The increase in interest in linguistic research could be explained by the collection of sufficient data for the years from the introduction of ICAO language requirements.

Chapter 2.6: concluding remarks on related works on Air Transport English

Aviation English became a focus of research starting in the early 2000s. Though, research into aviation language especially with reference to the increasing shift to English-language interactions, is still relatively small. In the frame of the study presented, the author has provided an updated bibliography of 2002-2021 studies on the English language and communication in aviation. The bibliography research has been developed from “Language and communication in aviation: an annotated research bibliography” (Friginal, Mathews and Roberts, 2019) covering 2002 - 2016 related research. The most prominent papers reflecting the development of Aviation English and its dominant research areas have been selected to accomplish the main aim of the study.

The results of the conducted study indicate that since the early 2000s, the research focus has shifted from official documents and pilot communications to the use of aviation English for beneficial business practices. This shift may be associated with the liberalization process in aviation, when government has been gradually loosened control over the aviation industry allowing airports and airlines be privatized. It leads to the growing competition: the research focus reflected an increasing demand for business solutions for the growing competitive aviation market 2017-2021.

Aviation English related works analysis identifies a gap of the research in the following areas: texts from webpages, official regulations, companies' policies, work reports, research papers in the domain of Air Transport to be utilized as databases for values identification and increasing the number of values.

Chapter 2: concluding remarks

1. The non-data-driven traditional tactic suffers from several disadvantages, that limits effectiveness in decision-making: human inputs, biases and subjectivity, prone to errors by human decision-makers, typically be more expensive, time-consuming. Taking advantage of the growing availability of process data from a wide variety of information sources within businesses is an opportunity to address these shortcomings in the decision-making in relation to process transformation.
2. To support a business process of delivering new value proposition, this research offers data-driven approach to identification of values, increasing numbers of values, and automation of this process.
3. Value proposition of the company in vast majority of cases is stated in the natural language and contains values delivered by words. Homepages, usually in the format of a landing page, contain factual information, including the value proposition expressed by an unstructured text.
4. Aviation English related works analysis identifies a gap of the research in the following areas: texts from webpages, official regulations, companies' policies, work reports, research papers in the domain of Air Transport to be utilized as databases for values identification and increasing the number of values.
5. From the Natural Language Processing perspective, values in the texts of value propositions can be considered as named entities and be identified using the technique known as Named Entity Recognition.

6. This dissertation proposes an entity recognition process in a specific domain which is air transport, and the entity is a value as a part of value proposition. The key highlights of the VER are: (1) design rule-based annotation experiment for value entities; (2) develop a semantic-based Value Entity Recognition (VER) tasks and a new efficient approach for VER in air transport domain; (3) use deep learning (DNN) to train and identify value entities from texts of air transport Twitter profiles of start-up companies. The semantic-based VER approach combines a NER-based approach and binary classification approach.

3 METHODOLOGY AND RESEARCH DESIGN

In this Chapter, the methodology and research design are discussed. The presented research is novel from the perspective of a set of existing methods, applied to a new task: to identify and expand the values in air transportation and to show the possibilities of automating the process of determination and expansion. A novel “*One-Word principle*” has been applied for the analysis of data.

3.1 Research Approach and Methods

A research procedure is divided into *seven steps*, which is reflected in Figure 20.

- 1) 1st step is the theoretical analysis on values aimed at determining meta-characteristics of the process of value identification and expansion in the air transportation domain. It includes:
 - Secondary data analysis: review of theoretical literature, previous research, policy documents
 - Framing: evaluation and conceptualization of approaches and notions
- 2) 2nd step determines ending conditions that should be met: values expressed by words are recognized and categorized, experts’ agreement is achieved and a model created
- 3) 3rd step adopts two approaches employed in the research: *empirical to conceptual* and *conceptual to empirical*.

Empirical to conceptual

4a) to identify subset of objects, a research base is determined as landing pages of start-up companies in the air transportation domain; values are annotated, dataset is created as a bottom-driven approach without prior conceptualization.

5a) to identify common characteristics and to group objects, semantic analysis of values is performed, aimed at potential categorization.

6a) to group characteristics into dimensions to create taxonomy, categories are examined and arranged hierarchically into subclasses and then classes.

Conceptual to empirical

4b) prior conceptualization of the characteristics and dimensions of objects: it is assumed that values in the texts can be identified and expanded automatically.

5b) to examine objects for these characteristics and dimensions, a neural network model was trained.

6b) a final dataset is received and accuracy is calculated.

7) confirm that final conditions are met.

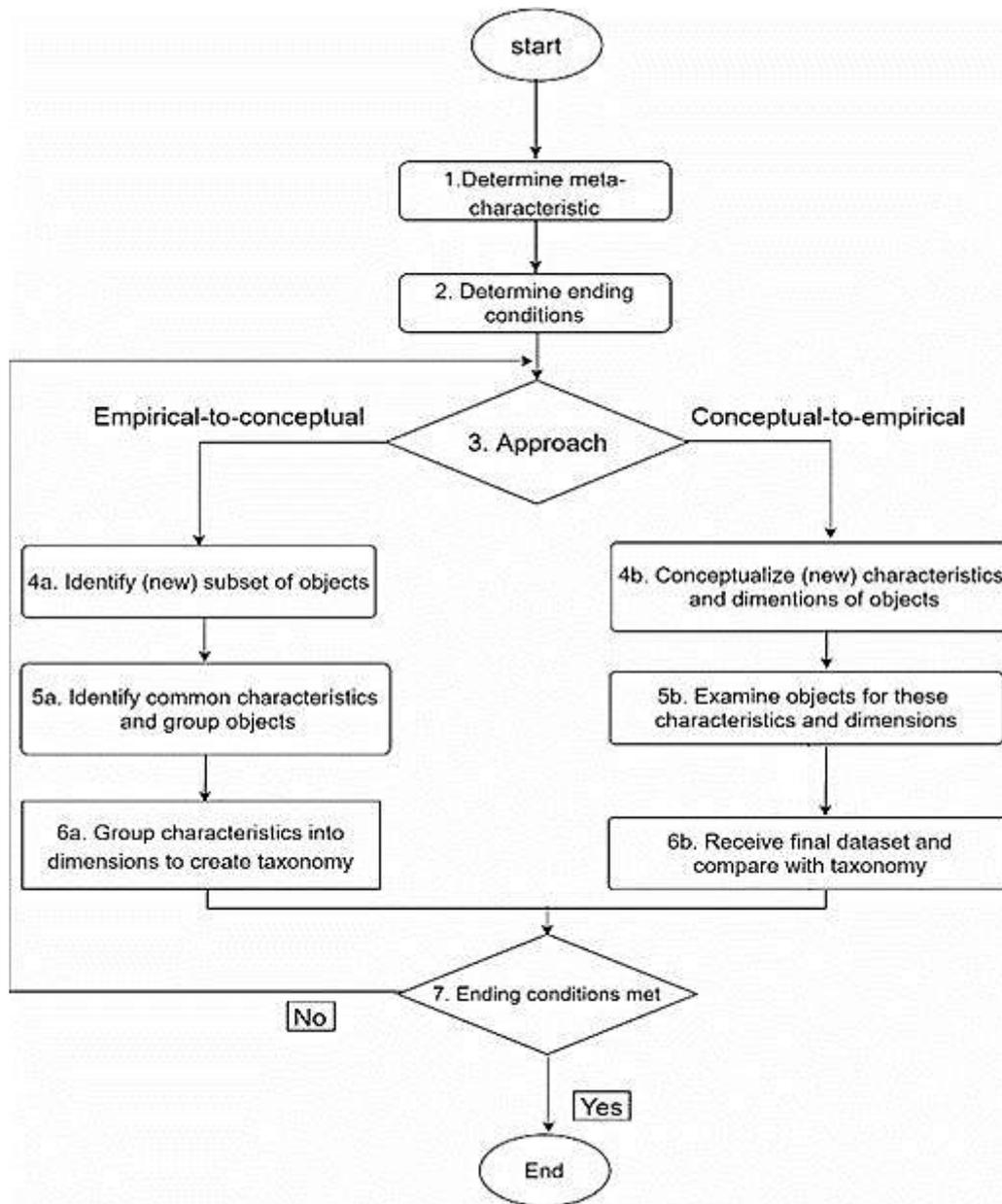


Figure 20. Research procedure

To develop the research procedure, modern approaches to Information Extraction from texts were examined and the following conclusion was made: the metadata extracted by IE tasks for understanding the raw text is treated as the semantic annotation, and the text analysis executors -humans or programs - tackling IE tasks as semantic annotators (see chapter 2.5).

Qualifying Value Entity Recognition as a task for semantic annotators, it was necessary to analyze the potential of different IE approaches for a novel task of value identification:

- *Named entity extraction*: recognize and classify atomic snippets in text as referring to

particular semantic categories (e.g., Person and Company) (Cunningham, 2002). In some cases, it also involves a subtask named entity disambiguation, which resolves entity identifiers of the entity instance detected (Li et al, 2013);

- *Relation extraction*: extract relationships between entities (Reichartz et al, 2010);
- *Sentiment annotation*: identify viewpoints or emotions in the underlying text. The attitude or tone can be polarity opinions such as Positive/Negative or comparison opinions such as Better/Worse or simply Subjective/objective (Ganapathibhotla and Liu, 2008);
- *Topic annotation*: attach documents with topics or themes (Silva et al, 2001);
- *Co-reference annotation*: catch co-referring mentions of a given entity (Deemter and Kibble, 1995);
- *Keyword annotation*: extract relevant keywords or terminology to the content the text (Liu et al., 2009).

From the Natural Language Processing perspective, values in the texts of value propositions can be potentially considered as named entities and be identified using the technique known as Named Entity Recognition. After the thorough evaluation of the nature of values as parts of value proposition (see 2.5), the new type of entity introduction - Value Entity Recognition (VER) - was introduced.

The above-described *approaches* have led to the choice of ***methods used for data collection***:

- Semantic annotation combined with a binary classification approach (if an entity is a value or is not a value) for landing pages labelling; Twitter profiles of the start-ups labelling.
- Survey – resulting from self-formulated answers to the open question *What values do you expect from air transportation industry?*
- The following ***data-analysis methods*** were applied for systemizing the obtained data: categorization and organization into taxonomies.
- A corpus of words constitutes an uncontrolled vocabulary, e.g., uncategorized and not organized for data retrieval. To use a vocabulary in thesauri, ontologies, taxonomies, and other knowledge organization schemes, the initial uncontrolled vocabulary is organized into a *controlled vocabulary* - controlled vocabulary is normally utilized for describing contents by allocating terms to represent metadata associated with content objects, organizing content on websites and the alike (University of Texas, 2022).

There are four important principles of vocabulary control that guide their design and development. To create controlled vocabularies, four major principles exist that help designing

and developing process: *to eliminate ambiguity, to control synonyms, to establish relationships of terms, to test and validate* (ANSI/NISO Z39.19-2005).

It is possible to identify many forms of semantic links between terms in controlled vocabularies. Those involve associative relationships, hierarchical relationships, and equality connections that can be described according to the needs of a given implementation.

Detailed description of methods of data categorization can be found in Chapter 3.4.

3.2 Procedure of the Experiment

To identify and expand values from texts of air-transportation start-up, there was conducted an experiment, consisted of **2 stages**. The 1st stage includes a survey and start-ups annotations (Figure 21) and the 2nd stage includes annotation of the Twitter profiles of start-ups from the 1st stage. The main technique used is annotation. Data annotation is a text-mining technique through which data is labeled to make objects (in this case - values expressed by words) recognizable by machines.

Research base

Experiment is conducted on the start-ups texts as a data source of values.

Experiment, Stage 1. 796 start-ups' landing pages of air transportation domain, source: www.crunchbase.com

Experiment, Stage 2. 796 twitter profiles of the start-ups from Stage 1 of air transportation domain, source: www.crunchbase.com

Specific characteristics of start-up companies make them a suitable source for values as reflected in Table 17. Start-ups differ from new small businesses and well-established companies in the following ways:

1. They possess Innovations based on new technologies or new business models
2. Their limited resources encourage them to compete differently. It leads to the novel values they deliver.
3. Start-ups texts are easily accessible: start-ups' bases are collected by industry domain. This research uses Crunchbase as one of the popular bases.
4. Start-ups' constant search for funds leads to open information.
5. Start-ups offer synoptic landing pages where a consolidated offer and a concentrated value proposition is found.

Table 17. Start-ups as a source for values

Start-ups as a source for values

<i>Novel values</i>	<i>Accessibility</i>
1. Innovations based on new technologies or new business models	1. Start-ups' bases are collected by industry domain
2. Limited resources encourage to compete differently	2. Open information aimed at constant search of funds
	3. Synoptic landing page: consolidated offer, concentrated value proposition

1st stage: Education, Pre-survey, Training, Annotation, Post-survey (Figure 21).



Figure 21. 1st stage of procedure

Annotators were educated about the value proposition concept, conducted a survey with open formulation of values in AT, trained to label values, labelled values and conducted a post-survey to find a difference with pre-survey for future research.

An online interface was created (Figure 22) and a database of 796 start-ups landing pages from air transportation domain was downloaded.

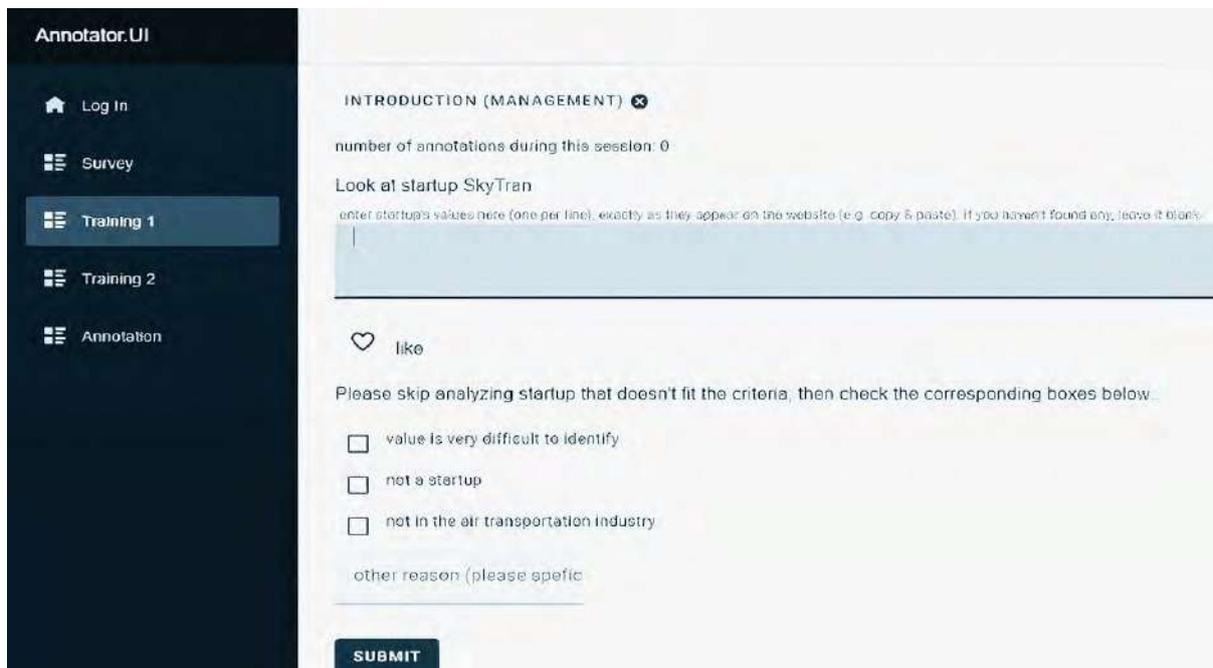


Figure 22. Online interface for Stage 1 - landing pages annotation

96 annotators from different background with no professional experience of value identification and English proficiency on the level of B2+ according to Common European Framework of Reference (CEFR) were tasked to annotate texts for values.

The aim of a preliminary survey is to understand the level of expertise for non-trained

participants and to determine value proposition volume and structure before the education process. The students were told about the basic concept of value proposition. After that they were asked to list as many values as they can, that are provided by the Air Transportation start-ups and companies.

After the participants were told the start-up concept, they learned existing Value Proposition major theories. After that they were offered two trainings. Training 1 shows five relatively simple examples of how to determine Value Proposition on start-ups landing pages. Training 2 presents five landing pages where the Value Proposition cannot be easily identified due to its vague expression or non-standard ways to promote their start-up, e.g., video.

The participants have options to identify a landing page as not a start-up, can state that the value is very difficult to identify, and can name the page as not from the air transportation industry. Also, they are asked to click a Like button if they think this start-up clearly delivers the Value Proposition.

A sample piece of output data received is presented on Figure 23.

```
"UserId": {
  "S": "75443"
},
"DbId": {
  "S": "631adcdb-064d-4335-9f8c-d0a1ee587e08"
},
"ItemId": {
  "S": "zeleros"
},
"IsFavorite": {
  "BOOL": false
},
"NotRelevantItemModel": {
  "M": {}
},
"ValuesText": {
  "S": "Scalable\nAutonomous\nFully-electric."
},
"JobId": {
  "S": "j2"
},
"CreatedAt": {
  "S": "2020-03-03T10:58:23.795043+00:00"
```

Figure 23. Sample piece of output data obtained from annotation platform

10 interviews with students were conducted online on a chat platform, 5 respondents were interviewed face-to-face, and 3 industry experts were interviewed face-to-face. Interviews with students were conducted to validate how smoothly the annotation process went. Interviews with industry experts aimed to receive valuable perspective on the research results. As the result

of the experiment, rich semantic metadata has been created. Two databases were collected: corpus of values from open-formulated survey and annotated values from texts of AT start-ups. The quality of annotation was re-assessed by industry experts.

3.3 Demography of Annotators

1st Stage

In order to collect generalizable observations on air transportation value proposition, for the 1st Stage there were recruited 96 students from the transport university with a connected, but still diverse range of majors and/or professional roles in a transportation field: Aviation Management, IT, Logistics. All participants were between 20-42 years of age.

Many participants had multiple years of experience in different types of professional roles, including 13 aviation mechanics (1-15 years), 14 middle level managers (1-5 years), 21 programmers (1-5 years), 16 administrators (1-7 years), and others without specific professional experience. Most participants were not aviation management experts - 65 reported that they had never heard of Value Proposition before, but never built a model, 31 reported that they had taken some classes about marketing and management with value proposition as a study material. No one reported being an expert in the field of air transportation marketing or management.

Three industry experts from the top air transportation organizations' management were introduced with the research results and interviewed: two commercial directors of international airports and one IT director of an international airline.

2nd Stage

Second stage of the experiment is consisted of annotation of values from Twitter profiles. Twitter profiles present 796 start-up companies, which landing pages were annotated in the 1st stage of the experiment. Two experience annotators with the deep knowledge of value proposition concept were employed. A separate online interface for annotation with profiles on the screen was created as shown on Figure 24.

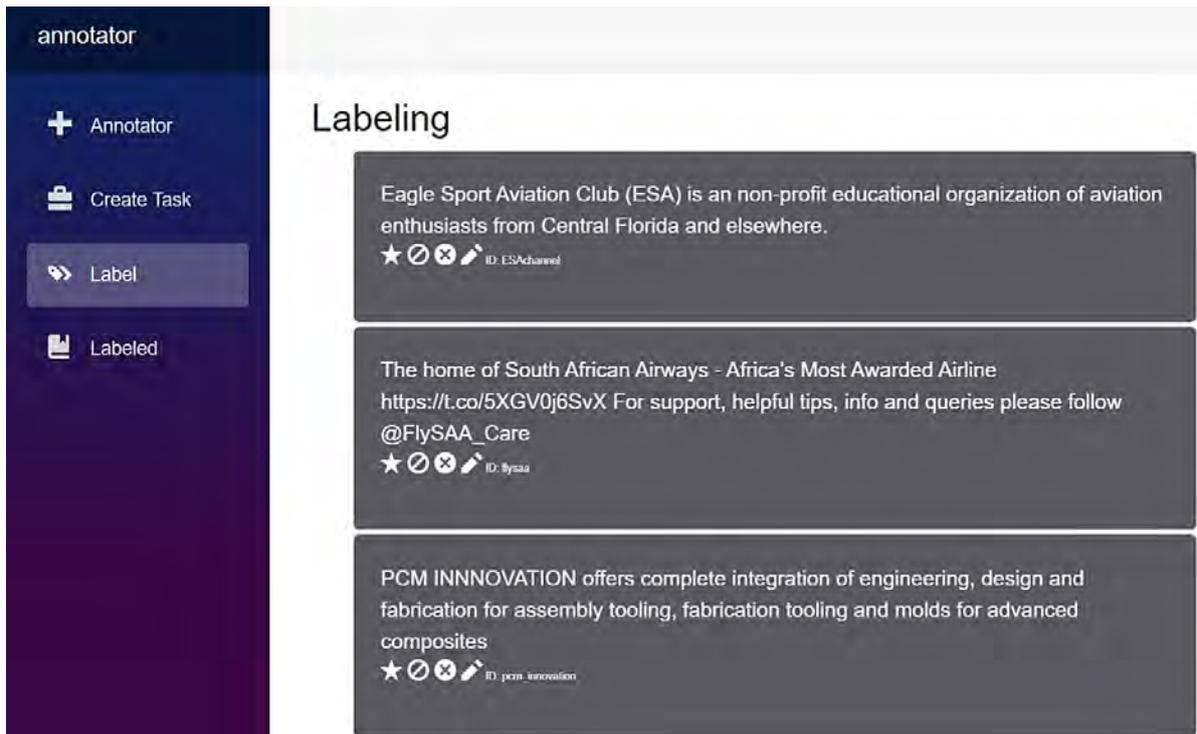


Figure 24. Online interface for Stage 2 - Twitter profiles annotation

As a result, a corpus of values from Twitter profiles of air transportation start-ups was collected.

3.4 Taxonomy Development Approach

Two taxonomies have been developed based on the received data: Air Transport Value Taxonomy and Semantic Taxonomy of Values in Aviation.

The information-retrieval thesauri arose from founding works in the 1960ies, so through 1974 practical guidance and standards for creating controlled vocabularies were established in the international standard ISO 2788 and United States of America standards such as (ANSI/NISO Z39.19-2005). Successfully updated later, those standards finally became the basis for ISO 25964-1: Thesauri and interoperability with other vocabularies. Figure 25 reflects the Landmark Thesaurus Standards from 1967.

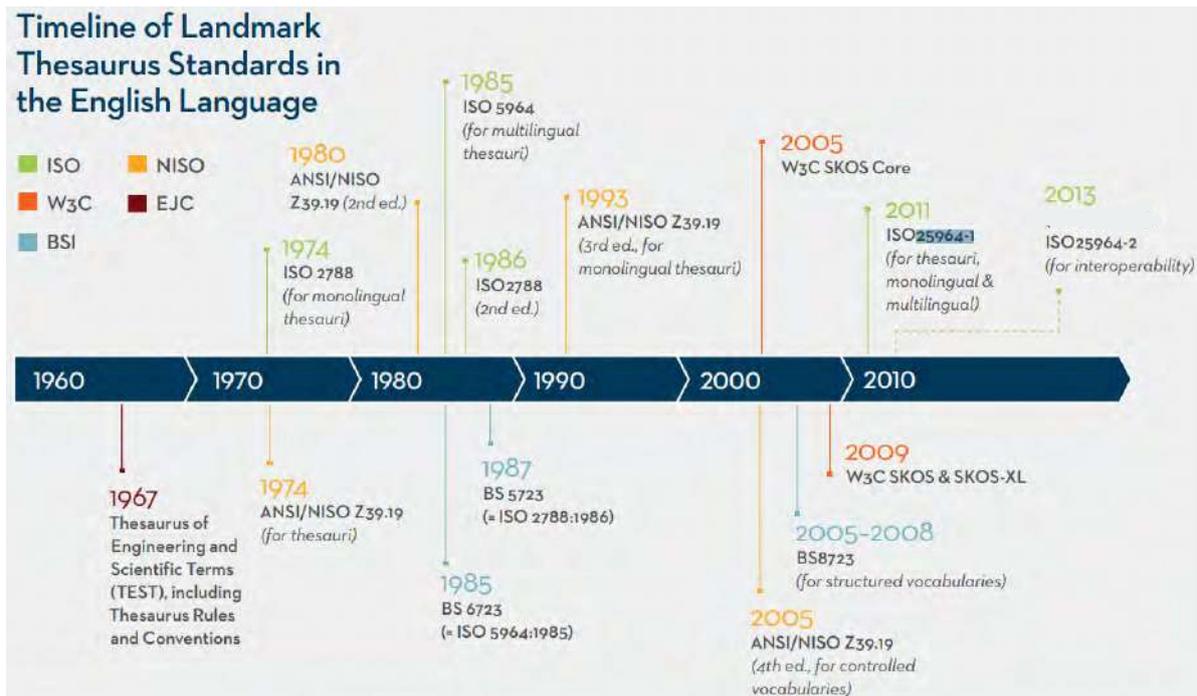


Figure 25. Timeline of Landmark Thesaurus Standards in English (Dextre Clarke and Zeng, 2012)

The design of displays for controlled vocabularies *should* take into account the needs of each anticipated class of user:

The needs of different controlled vocabulary users are summarized in Table 18.

Table 18. Interoperability needs of controlled vocabulary users

Who	Need
Searchers	Metasearching of multiple content resources using the searcher's preferred query vocabulary
Indexers	Indexing of content in a domain using the controlled vocabulary from another domain
Content Producers and Distributors	Merging of two or more databases that have been indexed using different controlled vocabularies
User Communities Indexers Content Producers	Merging of two or more controlled vocabularies to form a new controlled vocabulary that will encompass all the concepts and terms contained in the originals
Multilingual Users' Communities	Multiple language searching, indexing, and retrieval

Each of these needs presents special problems for the controlled vocabulary designer. One of the methods to address the numerous needs of users is to attract different groups of users to the controlled vocabularies development.

The construction and validation of taxonomies in this research was based on the collective contribution of air transport potential customers, searchers, multilingual users, and content producers and distributors (see Table 19).

Table 19. Users of ATVT and STAT

Who	Need
<i>Searchers</i>	Potential Air Transportation customers: 20-40 years, college students of IT, Logistics, Management background
<i>Content Producers and Distributors</i>	Air Transportation industry experts: two commercial directors of international airports and one IT head manager of the major airline
<i>Indexers Content Producers</i>	Air Transportation industry practitioners: airline web-content developers
<i>Multilingual Users` Communities</i>	Searching, indexing, and retrieval by multilingual potential customers, industry practitioners and experts

Construction Methods

Three initial approaches to controlled vocabulary construction are recommended by (ANSI/NISO Z39.19-2005):

The Committee Approach

Experts in the subject domain of the controlled vocabulary draw up a list of the key terms in the field and indicate the relationships among them, with assistance from experts in controlled vocabulary design. Lists of terms *may* be taken from various sources or submitted by various users / communities. Two main methods of creating controlled vocabularies by committee have been used.

Top Down - The broadest terms are identified first, and then narrower terms are selected to reach the desired level of specificity. The necessary hierarchical structures and relationships are created as the work proceeds.

Bottom Up - This case frequently occurs when lists of terms have been derived from a corpus of content objects and are then to be incorporated in a controlled vocabulary.

The Empirical Approach

The empirical approach has two basic methods:

The deductive method – Terms are extracted from content objects (by humans or computers), optionally during a preliminary stage of indexing, but no attempt is made to control the vocabulary, nor to determine relationships between terms, until a sufficient number of terms has been collected. All terms are then reviewed by a group of experts, preferably consisting of both information and subject specialists. They should first identify terms that represent the broadest classes, and then allocate remaining terms to these classes on the basis of their logical relationships, so that the hierarchies tend to be established on a broader-to-narrower basis. Vocabulary control should be developed at the stage where hierarchies and other relationships are established.

The inductive method - new terms are selected for potential inclusion in the controlled vocabulary as they are encountered in content objects. Vocabulary control is applied from the outset. If the vocabulary being constructed is to have some sort of hierarchical arrangements, each term, as it is admitted, is designated as a member of one or more broader classes that are constructed on an ad hoc basis at an early stage. The controlled vocabulary is therefore established on a narrower-to-broader term basis. Controlled vocabulary construction is regarded from the outset as a continuous operation. Assistance from subject experts is strongly recommended; these experts may serve as members of a formal editorial board or committee.

Combination of Methods

In practice, more than one of these approaches is likely to be employed at one stage or another during the construction of a controlled vocabulary, as admitted by (Dextre Clarke and Zeng, 2012). For example, hierarchies and other relationships among terms that were first established inductively could later be examined from a deductive viewpoint. Both techniques are essentially empirical, and it should be accepted from the outset that some decisions regarding the terms and their interrelationships that were made during the early stages of compilation may have to be revised as further experience is gained. The compilers should check terms and hierarchies frequently to ensure consistent application of principles in such procedures as the construction of inter-term relationships and the splitting of compound terms» (see One-word Approach, chapter 3.5).

The current research combined inductive and deductive methods.

Testing Methods

The quality of annotation results is essential for end-users and annotation-consuming applications. To examine the performance of the individual annotators in Named Entity Tasks, “black-box” testing is traditionally used - gold standard tagged corpora. The gold standard corpora include:

MUC7 dataset. The MUC7 dataset contains 300 newswire articles from New York Times Service for evaluating named entity recognition, total 18700 entities labeled. The articles of the dataset are selected from two different domains: aircraft accidents and missile launch events. They are annotated in SGML format with standard high-level concepts including Person, Organization, Location, Currency, Date, Time and Percentage.

Reuters corpus (RCV1). This corpus is released by Reuters. It consists of Reuters News stories as a standard benchmarking corpus for the IR/IE community. All the documents of the corpus are marked up in XML, subdivided into topics. The original Reuters corpus is

very large – it consists of 810,000 articles and 51100 entities labeled.

Fox corpus. The corpus is used by the Fox entity extractor and consists of 100 snippets of text from news headlines annotated with three concept types, namely Person, Location, and Organization – 395 entities labeled.

Till the best of author's knowledge, till today there is no Value corpora in any domain. For this reason, testing using the existing corpora is not applicable for the described experiment.

In this research the main quality assessment methods are the following:

1. Inter-annotator agreement
2. Users, searchers, industry experts' evaluation of the process and results.

Testing controlled vocabularies. There is little research or literature dealing specifically with the testing and evaluation of controlled vocabularies, which could be due in part to the difficulty of isolating the quality of a vocabulary from the performance of other elements of an information system such as content, technology, search engine, and interface (Tucker, 2020). However, the following methods are considered when faced with the challenge of measuring the quality or effectiveness of a controlled vocabulary:

Heuristic Evaluation - an expert or panel of experts is asked to evaluate a controlled vocabulary. Such an evaluation can be informal and qualitative (e.g., each expert sharing their reactions and opinions) or formal and quantitative (e.g., all experts assigning scores according to a shared list of criteria).

Affinity Modeling - a representative sample of users is asked to sort terms from the vocabulary into groups. The results are then analyzed against the existing term hierarchy. Users may also be invited to score equivalent and related terms according to level of similarity.

Usability Testing Holistic evaluation of the information system can yield insight into the efficacy of the controlled vocabulary.

This research adopts Summary of Standard Requirements / Recommendations from ANSI/NISO Z39.19 - 2005: Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies. Those standards prescribe among others: a concept of controlled vocabularies, terms scope, form and choice, semantic linking, Hierarchical Relationships, Types of Displays, Factors Affecting Interoperability, Construction, testing, maintenance, and management systems.

3.4.1 *Air Transport Value Taxonomy (ATVT)*

Air Transport Value Taxonomy was developed on the Pre-Survey data. The aim of a preliminary survey was:

- to collect data on expected values from aviation domain
- to understand the level of expertise for non-trained on start-ups participants
- to determine value proposition volume and structure before the education process
- to receive data on the respondents' perception and wording on values

The respondents were told about the basic concept of value proposition. Also, they were given some examples of Value Proposition such as typical ones: *affordability, quality, speed*; less typical: *eco-friendliness*. After that they were asked to list as many values as they can, that they expect to be provided by the Air Transportation industry.

To evaluate comprehensiveness and contextual factors, empirical-to-conceptual approach is adopted (Famerson, R., Varshney, U., and Muntermann, J., 2013): if the significant data about the objects is available, then starting with the empirical-to-conceptual approach is appropriate.

Following the empirical-to-conceptual approach, a subset of objects (terms) is identified that is wished to be classified: e.g., *low priced, friendly, multiple destinations, Wi-Fi on board*. These objects were value propositions from the surveys. Next, common characteristics of these objects are identified. The characteristics were logical consequences of the meta-characteristic. Thus, the author started with the meta-characteristic and identified characteristics of the objects that follow from the meta-characteristic. Once a set of characteristics had been identified, they were grouped formally using statistical techniques. The resulting groups formed the initial dimensions of the taxonomy.

To follow the best industry practices and to ensure the consistency of theoretical frame for air transportation values, (IATA Airline Taxonomy, 2019) of products and services (Figure 26) - the only existing taxonomy of air transportation products and services, presented in 2019 - was utilized in the process of classes and subclasses development.

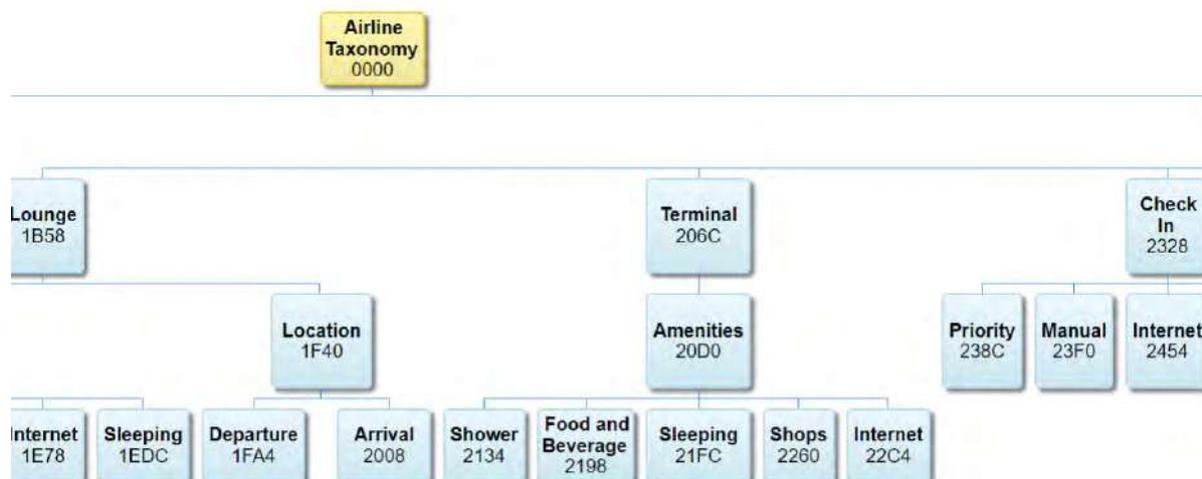


Figure 26. Part of IATA Airline Taxonomy of products and services (IATA Airline Taxonomy, 2019)

International Organization for Standardization terms were adapted (9000:2005 (ISO/TC 20)), for example, ISO/TC 20/SC 17 (Airport infrastructure), to gain recognizable terms for taxonomy nodes (classes names) aimed at the consistency of the established theoretical frame for air transportation.

The last step in the Air Transport Value Taxonomy construction was validation with three industry experts: one IT director of the international airline and two commercial directors of airports.

3.4.2 *Semantic Taxonomy of Values in Aviation (STVA)*

Language is inevitably and inextricably a fundamental component of business-to-customer communication. The effectiveness of this communications depends greatly on the correct usage of words semantics, i.e., the meaning of the word. To address this concept, the author chooses semantic approach for the developing of Semantic Taxonomy of Values in Aviation in Aviation.

As stated by Famer and Mairal Usón (1999), semantic theory proposes: a group of words with interrelated meanings can be categorized under a larger conceptual domain. This entire entity is thereby known as a semantic field or a semantic domain.

To analyze the semantic domain of Values in Aviation, the NarraText generic/global taxonomy (2017) was adapted (Figure 27). The NarraText generic/global taxonomy is designed to provide a near-comprehensive generic taxonomy that can be applied to the lexicon of any domain.

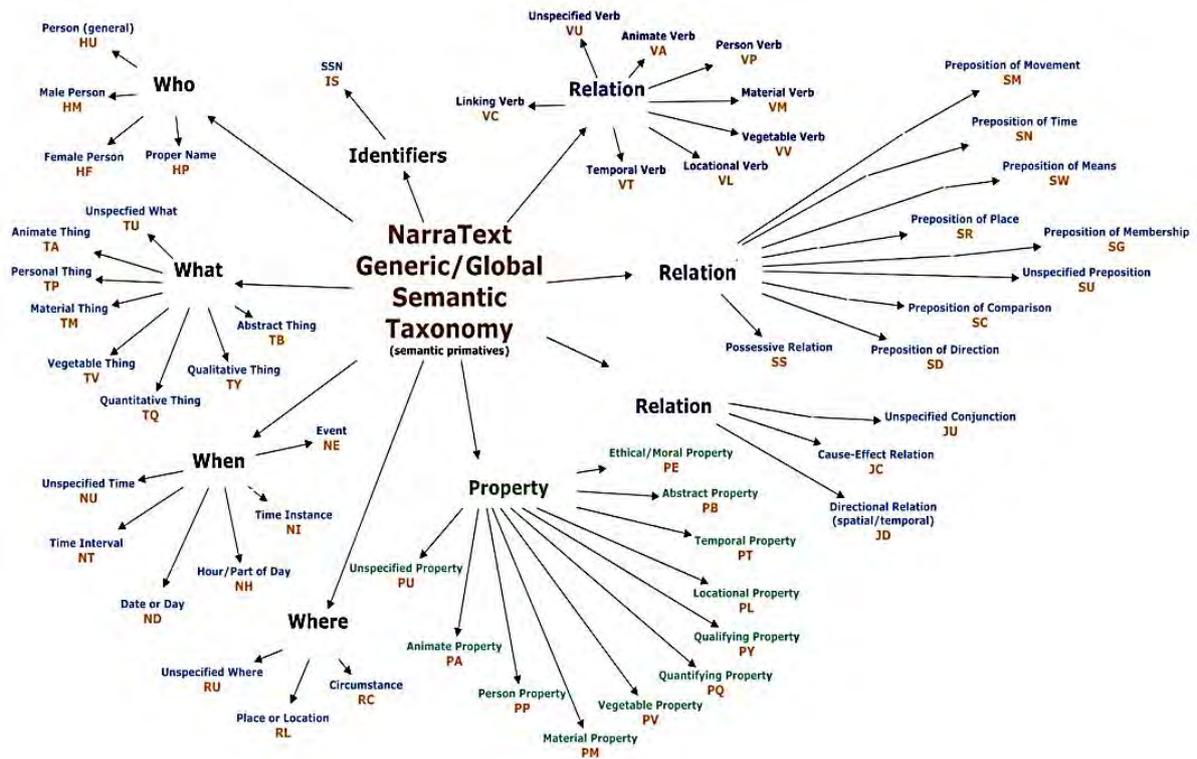


Figure 27. NarraText generic/global taxonomy (NarraText.com, 2019)

The NarraText Taxonomy includes semantic primitives (1) interrogative categories: WHO, WHAT, WHERE, WHEN, HOW, and WHY; (2) relational categories based on syntax: VERB, PREPOSITION, and CONJUNCTION; (3) property categories: qualifying property, unspecifying property, etc. (4) identifier categories, which were adapted semantically to the air transportation domain.

Semantic Taxonomy of Values in Aviation also aligned with International Organization for Standardization terms and was validated through interaction with air transportation experts: one IT director of the international airline and two commercial directors of airports.

Based on the approach and methods used two taxonomies of values in air transportation were developed. Below, the author presents the specific principle of data analysis applied in the process of Semantic taxonomy development and NLP model implementing – *One-Word principle*.

3.5 One-Word Principle and Experiment Findings

The design of automation faces the following problem: the number of words that constitute a value in the majority of cases is unknown. For explorative purpose, this research adopted a one-word approach to value identification and expansion algorithm for constructing Semantic Taxonomy of Values in Aviation. The taxonomy was developed according to the

proposition: *one value - one word*.

Simplifying task as binary classification was applied in the model creating: neural network training. To support *a one-word concept for values* in air transportation domain, separate research was conducted.

As a part of a current research aiming at automated value recognition, the author assumes that the majority of values could be captured by one word.

The validity of the assumption is investigated via experiments in the domain of aviation: it was evaluated on the Twitter profiles of 564 (out of 796 in the initial dataset; 232 were non-informative for different reasons like no value proposition or non-English content) start-ups in the domain of aviation and a survey where 96 respondents were given a task to formulate values in air transportation industry. While annotating for the Twitter profiles and during the value formulation experiment, respondents were given the freedom to perceive textual forms of values. Respondents could identify as value any part of speech, any part of the sentence, and any number of words on the Twitter profile of the start-up. Furthermore, it was at the discretion of respondents to choose either a phrase reflecting the value or one word.

The analysis of the Tweets annotation shows that more than 50% of all the values identified can be captured by one word: 73% of values were annotated as one-word value. Value formulation survey reflects 71% of all values being captured by one-word value. The one-word approach to value identification is beneficial as it provides simplification and proficiency. It allows for a more fine-grained analysis, e.g. a phrase *individual entertainment* can be annotated as a two-word value or one-word value. Even as a two-word value, the author provides its analysis as a conjunctive one-word approach: each word makes sense as a value, but as a phrase it is more specific and provides possibilities for constructing a hierarchical model. The hierarchy is based on an attributive expression. In grammar, an attributive expression was determined by Bolinger (1967) as a word or phrase that modifies the head noun, e.g., in *individual entertainment* the word *individual* is an attributive word. It could be *individual entertainment, seat, approach, glass or responsibility*; thus, *individual* provides value to those nouns. Alternatively, a phrase *cheap flight* creates one value - *cheap*, reflecting the idea of affordable air transportation since the word *flight* is very general in the aviation domain. In this way, the author considers a phrase *cheap flight* delivering one value – *cheap*, and omit the word *flight*.

The obtained results indicate that more than 50% of values are captured in one word which simplifies further quantitative and qualitative analysis. The research is limited by the

aviation domain and non-English speakers responding.

The findings of the research indicate that value proposition can be expressed by one word in the majority of cases. The benefits of a one-word approach include reducing of potential exponential search and the ability to consider attributive context to build a hierarchical model and an easy-to-navigate taxonomy. A taxonomy as a structured information is useful for effective decision-making. In the air transportation domain, a taxonomy of values provides possibilities for decisions on creating texts for companies' webpages.

Authors of texts for web pages are usually not limited in the number of words to describe a value proposition. When annotating aviation domain start-ups' Twitter profiles and landing pages or formulating values by their own words, respondents were given the freedom to perceive textual forms of values. Respondents could identify as a value any part of speech, any part of the sentence, and any number of words on the profile or landing page of the start-up. Also, it was at the discretion of respondents to choose either a phrase reflecting the value or one word.

Figure 28 shows an example of value proposition from a start-up Lilium (2021) offering an electric engine jet with vertical takes off and lands, enabling to offer flights from one city center to another city center. Value proposition is delivered by single words in the text: *anyone, anywhere, anytime*.



Figure 28. Lilium start-up value proposition (www.Lilium.com, 2021)

Figure 29 shows an example of a start-up SkyTran's landing page with a value proposition expressed not by single words in the text, but by several phrases: *high speed, high capacity, low cost*.

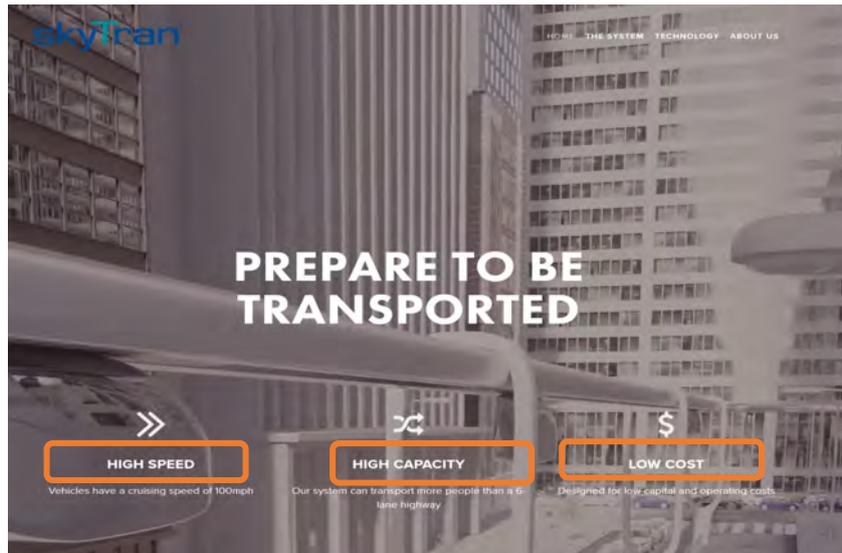


Figure 29. SkyTran start-up' annotated value proposition (www.SkyTran.com, 2021)

To explore the perception of words structure and volume in the online texts in search of values, the author applies a model which ranks and scales the language. Each language possesses a scale of grammar ranks. Each rank involves one or more elements of the rank below. Jones and Waller (2015) offer their Rank Scale Model in Figure 30 to show how the grammar builds a language from the little morpheme up to the large unites that are called texts.

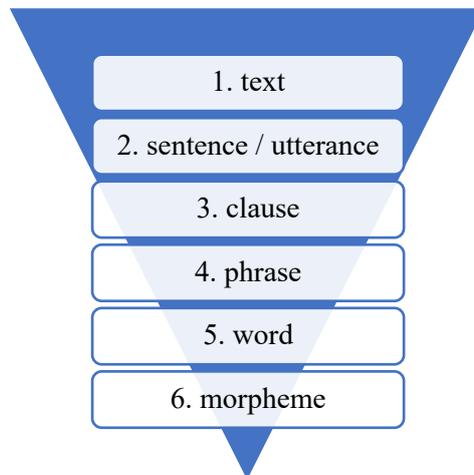


Figure 30. Rank Scale Model of the language grammar (Jones and Waller, 2015)

Figure 31 shows the analysis of the text from Figure 29, when applying Rank Scale Model.

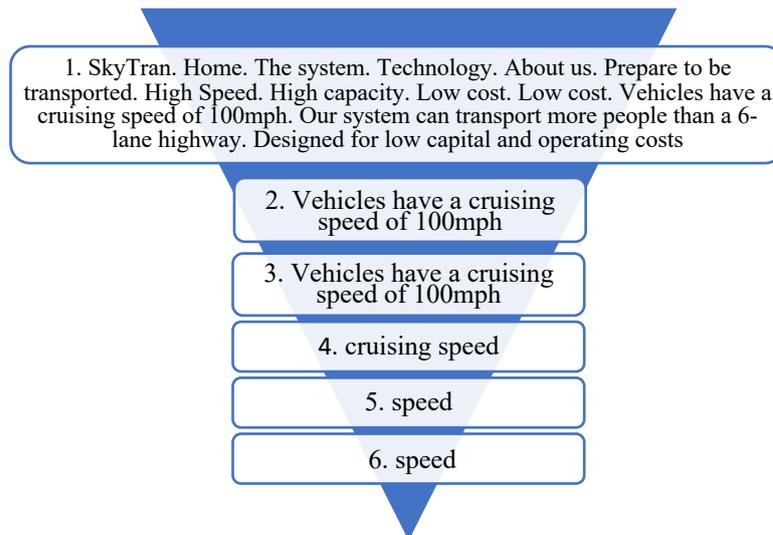


Figure 31. Application of Rank Scale Model (Source: constructed by authors)

The start element for Rank Scale Model is the text. Start-up landing page from Figure 29 offers the following text, it is all the sentences and words together that the respondents see when open the webpage:

SkyTran. Home. The system. Technology. About us. Prepare to be transported. High Speed. High capacity. Low cost. Low cost. Vehicles have a cruising speed of 100mph. Our system can transport more people than a 6-lane highway. Designed for low capital and operating cost.

The next level of the Rank Scale Model is the sentences. Respondents asked to annotate a web page for values, start to look through the text for separate sentences or standalone words. The last ones can be considered as sentences consisted of one word. David Crystal (2011) in his student guide for Internet Linguistics defines a minor sentence as one “where there is limited productivity, or where the structure lacks some of the constituents to be found in the major type”. Minor sentences are more specific for tweets, webpages, speech and chats than for formal or academic English.

In the sample analysis in Figure 31, there is a sentence illustrating a next element in the Rank Scale Model: *Vehicles have a cruising speed of 100mph*.

As respondents were educated to consider value proposition to be expressed by an attractive (catchy) word or short phrase, they start to look for them on the sentence level. The sample model from Figure 31 shows a possible value phrase: *cruising speed* on the phrase element level. The clause element level is omitted as the sample sentence contains only one independent clause: *Vehicles have a cruising speed of 100mph*.

The word level of the model shows the term *speed*. It is assumed that the word *speed* is

the only word in the phrase *cruising speed* to deliver value proposition: the company uses the word *speed* to offer a fast transportation with the help of new technologies.

The morpheme element level shows the word *speed* as the root morpheme. *Speed* here is a base word and other morphemes as the smallest units of words can be added.

In the start-up from Figure 32, the word *speed* was not annotated from the sentence *Vehicles have a cruising speed of 100mph* in the real-life experiment. Annotators were instructed to annotate the most evident and eye-catching words and phrases, as it would happen in real-life browsing the Internet. A report of 7 billion user sessions was published by Contentsquare's 2020 Digital Experience Benchmark report (2020) with the result of 62 seconds per page across industries as the average time. The interest of this paper is to identify the primary values which should be the most prominently featured.

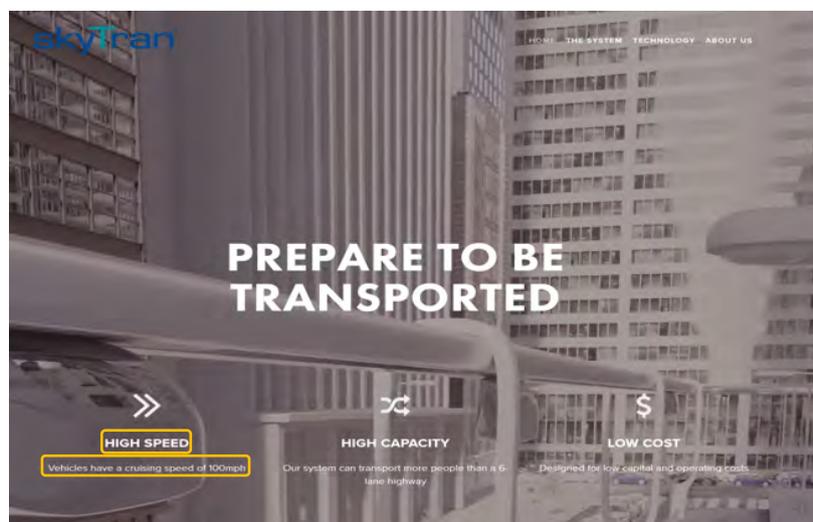


Figure 32. Value print difference (SkyTran, 2021)

Figure 32 shows the start-up's landing page with the evident comparison of the font scale for the sentence *Vehicles have a cruising speed of 100mph* and *HIGH SPEED* phrase. *HIGH SPEED* phrase large printed was annotated by the vast majority of respondents as a value proposition. No one annotated *Vehicles have a cruising speed of 100mph* for the word *speed* or any word supposedly due to the small font.

Value Survey. To collect generalizable observations about the value proposition for air transportation, the author enrolled 96 students from a transportation university with a related, but still wide variety of majors and/or job skills in the transportation sector: logistics, aviation management, information technology.

All respondents were between the ages of 20 and 42. Numerous respondents counted several years of experience at a variety of professional positions, involving 13 aviation

mechanics (1-15 years), 14 middle level managers (1-5 years), 21 programmers (1-5 years), 16 administrators (1-7 years), and others. None of the participants identified themselves as aviation management or marketing experts: 65 respondents said they were not aware of the Value Proposition concept previously, while 31 said they had completed some marketing or management programs that included value proposition as a learning topic.

The experiment was conducted in English, all respondents had been studying English for at least 10 years at the secondary school and university levels. The author resumes the assumption that aviation companies provide service to both English and non-English speakers and use English language to communicate with both segments of clients. That way, aviation English is a clear and not complicated tool for communication, aim to message consumers with satisfactory but not flawless level of English.

Respondents were given short 10-minute training on the concept of value proposition. Then, they were asked to complete a specifically designed web interface with values they expect from the air transportation industry. No time-limit was set up.

Data set constructed includes all the word excluding stop words. Wilbur and Sirotkin (1992) explain stop words as the terms, such as “of”, “the”, “and”, that provide grammar function for the language, but the content is not affected.

Twitter annotation. Two annotators with the expertise in value proposition proved by numerical publications in peer review journals (Zervina et al, 2019, 2020) labeled 564 (out of 796 in the initial dataset; 232 were non-informative for different reasons like no value proposition or non-English content) Twitter profiles of the aviation domain start-ups. Words indicating values as a part of value proposition were annotated. In the resulting data set, stop words were excluded.

Value survey. There were 2,227 words, 588 values captured. Table 20 provides distribution of values according to number of words per value in the Value Survey:

Table 20. Values distribution by word number in Value Survey

One-word value	Two+ words value	Total
415	173	588
71%	29%	100%

The Margin of Error is +/- 3.67%.

Twitter annotation. 564 Twitter profiles were annotated with 3015 words and 763 values captured. Table 21 provides distribution of values according to number of words in Twitter annotations. The Margin of Error is +/- 3.15%.

Table 21. Values distribution by word number in Twitter annotations

One-word value	Two+ words value	Total
558	205	763
73%	27%	100%

As seen from the above tables, more that 50% of values as part of the value proposition can be captured by one word, which leads to the hypothesis not being rejected.

Chapter 3.5: conclusions on One-Word principle

Two experiments were conducted (a survey and value annotation of Twitter profiles) as a part of a broader research dedicated to value creation in the aviation industry. The experiments aimed at exploring if the majority of values can be captured in one word. Using data capturing technologies, the author created a database of an annotated values (where value proposition was delivered by one word).

The assumption formulated in the research - the majority of the values can be captured by one word - was not rejected.

The fact that most values can be expressed by one word makes it possible to utilize methods of analyzing values that were impossible or difficult for values expressed in more than one word. For example, the construction of classifications, quantitative comparison, linguistic analysis of parts of the speech and the use of separate attributes.

Binary word classification *value / non-value* benefits in the following:

- Fine-grained analysis possibilities including taxonomies construction
- Reducing of potential exponential search
- Ability to consider attributive context to build a hierarchical model
- Webpages texts development insights
- New marketing opportunities

Based on the results of this research, organizing identified values by the means of taxonomies using One-Word approach resulted in developing Semantic Taxonomy of Values in Aviation.

4 KEY FINDINGS AND RESEARCH RESULTS IMPLEMENTATION

In this Chapter, research key findings are described. The results implementation with a model for which a neural network was chosen is presented. Finally, this Chapter provides a table with the responses to the research questions.

The obtained findings are as follows.

- 1) *Conceptual analysis and identification of concepts* (building a conceptual framework) were conducted:
 - Changes in the focus of research on Aviation English for domains in 2002-2016 and 2017-2021 were specified.
 - Air transportation value shift through history was identified.
 - Etymological genesis of the term *value proposition* was developed.
 - Key factors influencing value proposition in aviation were identified.
- 2) *The corpus of values in air transportation consisting of 3 parts* (survey, start-ups annotation and Twitter profiles annotation) was constructed and a Neural Network model was trained
- 3) *One-word approach* for capturing values in the texts was conceptualized
- 4) *Two classifications of values* in air transportation domain were constructed:
 - Air Transport Value Taxonomy, customer perspective
 - Semantic Taxonomy of Values in Aviation, industry perspective
- 5) *Methodology of automated identification of values from texts is developed*

4.1 Conceptual Analysis and Identification of Concepts

To build a conceptual framework of the *value proposition* notion and *values* as part of it, to identify the role of values in Air Transportation strategic management, and to review the literature on the research of English language usage in Air Transportation, a series of studies was performed with the results described in this chapter.

Results of conceptual analysis and identification of concepts are presented in the theoretical part of this thesis *Values as Part of Value Proposition in Air Transportation Industry*:

- Changes in the focus of research on Aviation English for domains in 2002-2016 and 2017-2021 were specified (see 2.6.5, Figure 19)
- Air transportation value shift through history was identified (see 1.1.7, Table 4)
- Etymological genesis of the term *value proposition* was developed (see 1.1.5,

Figure 4)

- Key factors influencing value proposition in aviation were identified (see 1.1.8, Table 5).

4.2 The Corpus of Values in Air Transportation

4.2.1 *Corpus*

A corpus of values in air transportation domain is created consisting of three parts:

1. Survey based and resulting from self-formulated answers to the open question What values do you expect from air transportation industry? with 241 values (see Appx IV).
2. Annotation based and resulting from start-ups' landing pages labelling with 588 values (see Appx VIII).
3. Annotation based and resulting from Twitter profiles of the start-ups labelling with 763 values (see Appx XIV).

4.2.2 *Implementation with neural network*

Based on Experiment, Stage 2.

Semi-supervised method of value extraction was applied with the following steps:

1. Set of documents (564 Twitter profiles of aviation start-ups) was used as a source base for value recognition
2. Labelling (annotation of values) by experts assumed words containing values as part of value proposition to be tagged as value entities. Combined method of semantic and binary annotation was utilized.
3. Dataset of 763 values was finally obtained as the result of annotation.
4. Pre-processing (filtering, normalization: Python) included One-word principle: one value is expressed by one word.
5. Simplifying task as binary classification: binary classification (value / not value) instead each value being a class which allows to pick up new values
6. A neural network model from spaCy library is used as a binary classifier.
7. Training and evaluation: Figure 33 presents the process of training spaCy model.

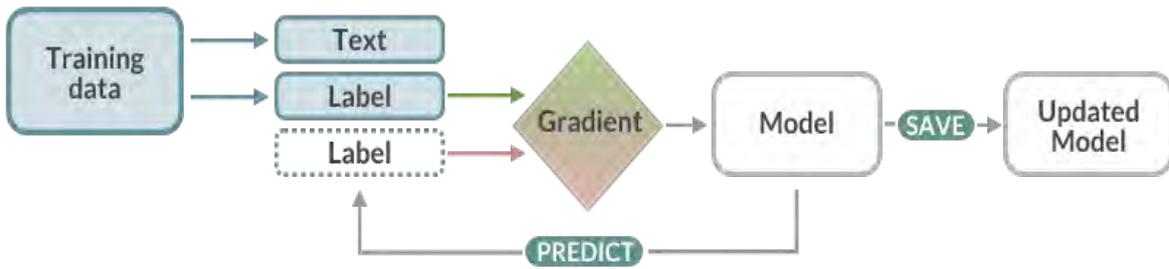


Figure 33. Process of training the model

The word corpus used is "spacy.Corpus.v1" for English language.

Model architecture is Spacy.TransitionBasedParser.v2. Transition-based parsing is an approach to structured prediction where the task of predicting the structure is mapped to a series of state transitions.

Architecture (see Annx XII for details):

Hidden layer size = 64 neurons

Parser consists of 3 subnetworks:

- 1) tok2vec layer (transforms words (tokens) into vectors)
- 2) "lower" layer (the "meat" of neural network, converts vectors to internal representation)
- 3) "upper" layer (feed-forward layer that calculates scores from the previous layers' vectors)

The scores then are used to predict the label for the word.

Figure 34 shows the training progress, where *ents_p*, *ents_r*, *ents_f* are the precision, recall and f-score for the NER task.

Error analysis is based on the following data:

```

"ents_p":0.8445503276,
"ents_r":0.8747686613,
"ents_f":0.8593939394,
"ents_per_type":{
  "not_value":{
    "p":0.8446718844,
    "r":0.9518317503,
    "f":0.8950558214
  },
  "value":{
    "p":0.8333333333,
    "r":0.1020408163,
    "f":0.1818181818
  }
}
  
```

For a complete error analysis, per-class precision, recall and f-measure, please, follow the link <https://t.ly/1F5U>

```

===== Training pipeline =====
[i] Pipeline: ['tok2vec', 'ner']
[i] Initial learn rate: 0.001
E   #       LOSS TOK2VEC  LOSS NER  ENTS_F  ENTS_P  ENTS_R  SCORE
---  ---  -
0   0       0.00       75.80   55.76   49.89   63.20   0.56
0   10      0.99       710.78  71.61   61.04   86.59   0.72
0   20      3.28       451.60  72.88   62.92   86.59   0.73
0   30      3.09       400.33  76.67   68.96   86.32   0.77
0   40      5.55       289.59  81.32   78.57   84.27   0.81
0   50      9.35       267.72  82.42   80.03   84.95   0.82
0   60     11.34       254.40  82.69   79.70   85.91   0.83
0   70     10.72       225.34  83.03   79.97   86.32   0.83
0   80      9.20       236.51  81.70   80.67   82.76   0.82
0   90      6.87       244.33  84.25   81.30   87.41   0.84
0  100      7.37       247.18  84.38   81.08   87.96   0.84

[+] Saved pipeline to output directory
spacy_output\model-last

[2021-11-10 16:17:39,067] [INFO] Set up nlp object from config
[2021-11-10 16:17:39,076] [INFO] Pipeline: ['tok2vec', 'ner']
[2021-11-10 16:17:39,079] [INFO] Created vocabulary
[2021-11-10 16:17:39,081] [INFO] Finished initializing nlp object
[2021-11-10 16:17:39,753] [INFO] Initialized pipeline components: ['tok2vec', 'ner']

```

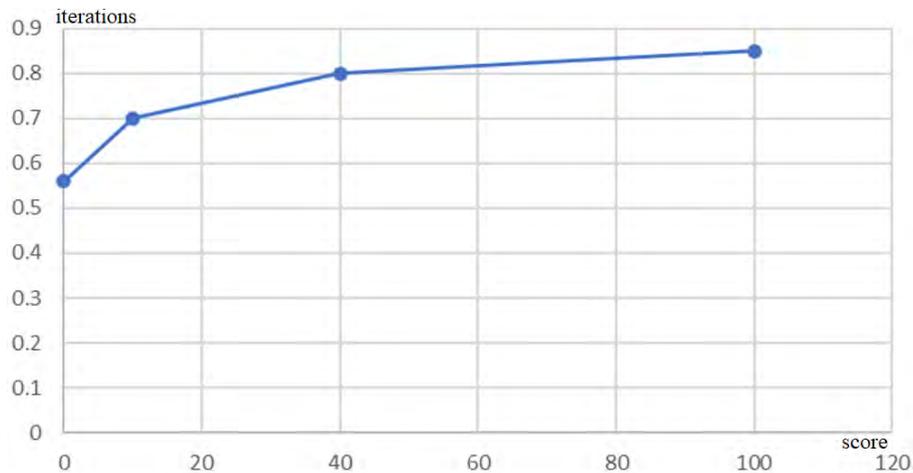
Figure 34. Pipeline

Start from Score 0.56, after 10 training iterations the score raised up to 0.72, after 60 training iterations the score raised up to 0.83.

The experiment was stopped at 100 iterations with the score at 0.84 because of the following reason:

1. improvement flattens out (becomes incremental) (see Table 22)
2. to avoid overfitting

Table 22. Graph of iterations / score correlation



Metrics are as follows: precision - 0.85; recall - 0.89; f1-score = 0.87

For a code, see Annx XIII.

4.3 Classifications of Values in Air Transportation Domain

The conducted experiment allowed collecting an extended database of values. To systemize the data, two taxonomies were created:

- *Air Transport Value Taxonomy*, customer perspective, survey-based
- *Semantic Taxonomy of Values in Aviation*, industry perspective, annotation based

4.3.1 *Air Transport Value Taxonomy: description*

A survey, conducted using an open-ended question *What values do you expect from air transportation industry*, allowed to obtain a dataset of self-formulated 241 values. To categorize them, a taxonomy was constructed. The adopted survey methodology with open-ended questions and self-formulated answers allows to attribute this taxonomy to reflecting the consumer's perspective.

The taxonomy *Air Transport Value Taxonomy* was modelled as a tree diagram which is reflected in Figure 35.



Figure 35. Air Transport Value Taxonomy

A term in the taxonomy is either an object term (e.g., *seat*), or an attitude term (e.g., *friendly*), or an approach term (e.g., *no child on board*, *save time*). Taxonomy groups of all levels contain all types of terms and are united by the same concept of air transportation value proposition. Differentiating object terms from approach or attitude terms is semantically expected for natural language processing and does not influence the concepts.

Taxonomic classes, divisions, subdivisions, and categories (Figure 36) were developed from the 241 values describing activities, procedures, objects, emotional experience and considering the context in which they could be possibly associated with in air transportation.

A number next to the term reflects how many times this value was referenced by the respondents, e.g. *Friendliness 9*. A number next to the name of a category reflects the total number of all references in this category, e.g. *Affordability 117*.

By analyzing the terms and the context, five taxonomic classes, one subclass, three divisions, and eighteen categories have been developed. Each of the 241 lowest level terms fits into at least one taxonomic group. However, many of them belong into more than one taxonomic group. Categories are not mutually exclusive. Figure 36 presents the taxonomy grouping.

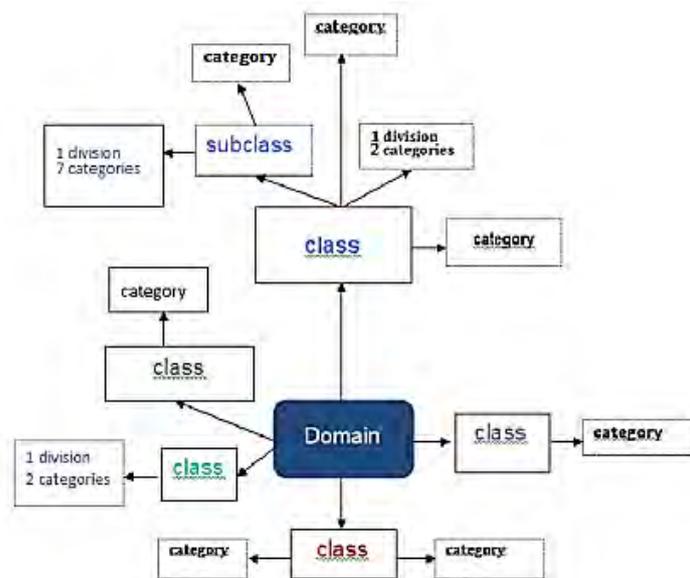


Figure 36. Taxonomy grouping

Every group and each term present a number of people that name this value / group of values. The most frequent terms are:

- speed 71;
- safety 60;
- comfort 53.

The weight of each group is a sum of its components. The biggest group is Service with 356 and the smallest one is Ecology with 31.

Terms that could belong to several classes are noted with a bullet of a corresponding class's color.

4.3.2 *Semantic Taxonomy of Values in Aviation: description*

An annotation of texts in landing pages of start-up companies in air transportation domain allowed to collect a dataset of 588 values. Using a frequency threshold equal to 12, 196

values were captured for the following analysis. To categorize them, a taxonomy was constructed (Figure 37). The methodology of annotating texts created by companies allows to attribute this taxonomy to reflecting the industry's perspective.

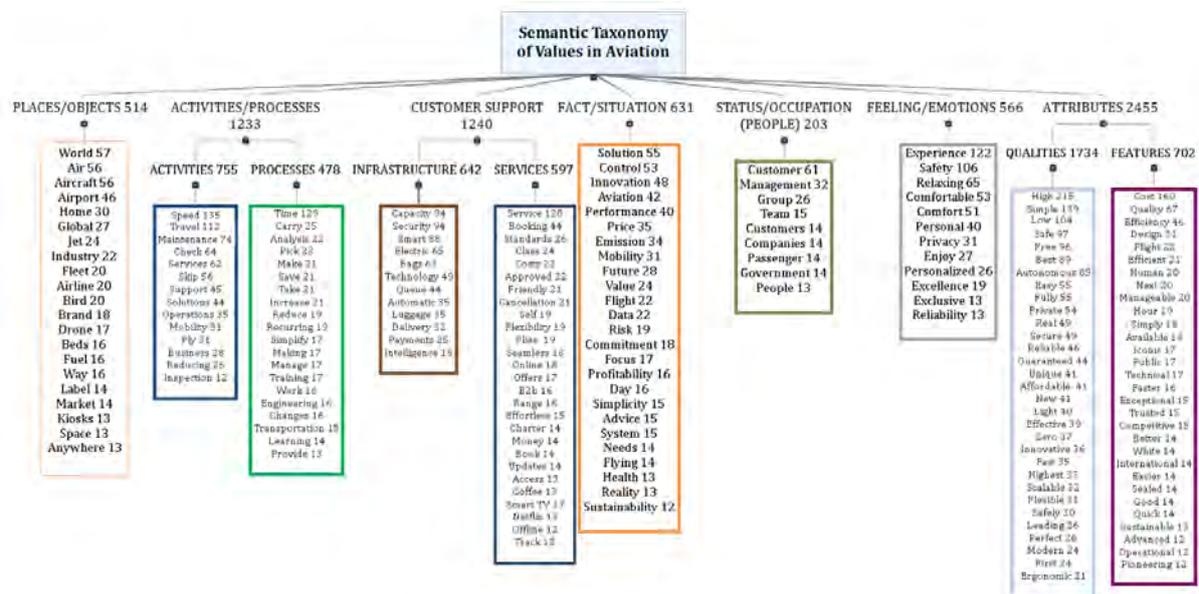


Figure 37. Semantic Taxonomy of Values in Aviation

Taxonomy groups of all levels are not tied to specific parts of speech and are united by the same semantic concept.

Categories are not collapsed by excluding partial synonyms as to preserve semantic difference might be important for marketers and customer service. Taxonomic classes and subclasses were developed from the 196 values describing activities, procedures, objects, emotional experience and considering the context in which they could be possibly associated with in air transportation.

By analyzing the terms and the context, seven taxonomic classes and six subclasses have been developed. Each of the 196 lowest level terms fits into at least one taxonomic group. However, many of them belong into more than one taxonomic group and was assigned to a specific group under the five experts' agreement: two of the experts have degree in Linguistics and 20+ years of linguistic research, one expert possesses a PhD and 20+ years in Natural Language Processing, one expert is a top manager of the regional airport holding PhD, and one expert is Information Technologies Director of International Airline with 20+ years of experience in air transportation. Categories are not mutually exclusive, but this taxonomy is not aimed to provide overlapping semantic clustering.

Every group and each term present a number of people that name this value. The most frequent terms (stop words excluded) are: high (215), cost (160), and simple (53). The weight of each group is a sum of its components. The biggest group is Attributes with 2455 and the smallest one is Status / Occupation (People) with 203.

4.4 Proposed Methodology of Automated Identification of Values from Texts

Figure 38 presents the final result of the research and the achievement of the research aim – the Methodology of Automated Identification of Values from Texts.

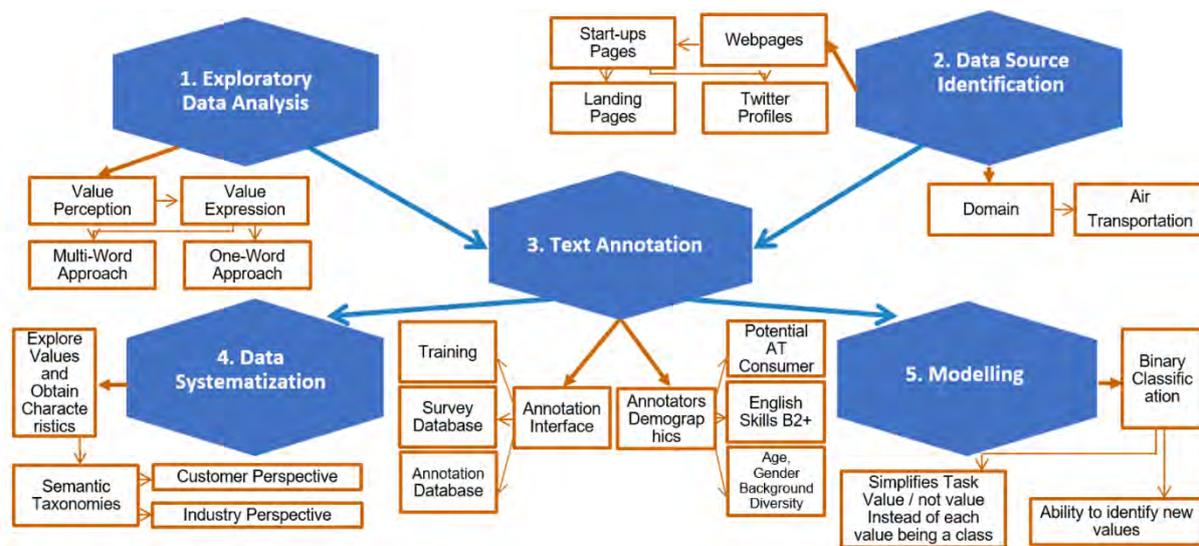


Figure 38. Proposed methodology for automatic identification of values in the domain of air transportation (author's made)

The proposed methodology is limited by one domain – Air Transportation as Air Transportation domain was accepted and tested in the case study in this research and the developed Natural Language Processing model can be implemented to the texts of Air Transportation.

Nevertheless, the methodology is applicable to any domain and if follow all the steps consistently, since the methods of semantic annotation and data categorization have no domain restrictions and start-up companies as data source cover most industries.

4.5 Response to Research Questions

In Table 23, the answers to the Research Questions are presented.

Table 23. Research Questions and Research Answers

Research Question	Research Answer
1. How the notion of value is defined in literature?	The philosophical ground and factual implication of value concept was investigated and traced the path of becoming a component of the value proposition concept
2. Why does aviation industry require value expansion?	Aviation industry values were examined for their historical background, their modern utility, and challenges
	Aviation industry specific factors that influence the values and value shift were identified
3. Can values be identified manually?	An experiment annotating texts of the start-ups of air transportation domain was conducted, values were successfully identified, and a corpus created
4. Can number of values be identified and expanded automatically?	The quantity and the frequency of the obtained values were calculated. The quantity outnumbered the traditional number of values in aviation organization. Frequency shows a degree of demand
	A neural network model was trained on the corpus of Twitter profiles of air transportation start-ups with the accuracy of 0.85
5. Can values be categorized?	Two value categorizations were developed in the form of taxonomies: Air Transport Value Taxonomy and Semantic Taxonomy of Values in Aviation

5 RESEARCH RESULTS DISCUSSION

This chapter discusses the research results in perspective of their theoretical and empirical contribution as well as taxonomies semantic limitations, value shift, and practical importance of the results. The problem posed by this research was the potential to automate the identification of values and thus facilitate it and expand the number of values. Questions about the types of values, the principles and completeness of their categorizations remain open, but the baseline was established.

5.1 Contribution

The analysis presented in this dissertation supports the initial thesis that values as a part of value proposition can be automatically identified and number of values be increased. Additionally, this research seeks to contribute to the existing practice and literature both empirically and theoretically.

5.1.1 *Theoretical contribution*

These analyses increase the theoretical understanding of the value notion, value comprehension by the customers, and theoretical framework of the methods of value automated identification and expansion.

This research is the first to conduct a task of automated value identification and expansion. It provides the theoretical framework of automated value identification and expansion that can be applied to any domain.

The research explains which factors should be considered in automated identification and expansion of values as part of value proposition: notion of value, annotators agreement, one-word approach in the classification, classifier's accuracy.

Finally, the provided categorizations of values in the form of taxonomies contributed into the following:

- Create a common language for sharing concepts, allow to integrate information sources
- Allow for knowledge discovery (patterns, trends), uncover visual patterns fit, compare and contrast new data
- Improve process efficiency by allowing for reuse of information rather than recreation
- Match items or contents sharing the same concepts; understand how each observation or part fits into the whole
- Facilitate content management workflow

- Provide consistent metadata for identification, comparison, analysis
- Interpret the layers of meanings and the multiple perspectives, search for overlap, exclusivity, or hidden meanings among categories
- Engage in the thinking process of integration, searching relationships

Concluding, this research provides the novel concept of a possibility for automated value identification and expansion which leads to the potential categorization.

5.1.2 *Empirical contributions*

This study is the first considering values as a part of value proposition as the primary field of investigation. Additionally, this study uses a novel approach for taking texts of start-up companies as a research base for identifying and expanding values. This broadens the existing techniques on developing value proposition of a company. Moreover, the obtained data show that values can be significantly extended and categorized to support the decision-making process. Through this, it was identified that deep learning tools can be utilized to automate the process of value identification and expansion.

The possibility of values' extension in numbers and their hierarchal categorization enables the consideration of a much wider range of more common mechanisms of value analysis such as market research and comparative analysis of competitors. This is important as novel value developing activities can be difficult to align with traditional company activities and require substantial effort and an additional skillset to accomplish.

Lastly, the information gleaned from the operations of the numerous start-up enterprises provides insight into innovative tasks in air transportation, given that start-ups are among the earliest innovators. Additional use of the proposed methodology could provide a comparison basis for refining this comprehension and expanding the data set

5.2 Discussion

5.2.1 *Taxonomies semantics and limitations*

Taxonomies were developed based on semantic principles of constructing categories. Some of the presented classificatory categories and practices though they may appear inevitable are actually as (Hacking, 1999) stated contingent and relative to the practice of classification in the context of social institutions and norms. As an example, the idea of entertainment during air travel seems to be constructed by marketers, however, according to (Hacking, 1999), some constructed categories reflect real divisions, and so no need to be

constructivists in the strong sense. Air Transport Value Taxonomy offers a separate category named “Entertainment & Pleasure” with 32 identified values. Thus, it supports the idea of a real-life requirement for this category as the taxonomy was developed based on a survey data set.

There is still room to distinguish between constructed kinds that reflect real categories and those that do not. Human beings start to present extra worries when evaluating the naturalness of their human kinds. That way there is a place for a question if the value, for example, of eco-friendliness is a human kind or a natural kind from the given world. And if it is possible to educate consumers to feel the necessity of proposed values.

Kinds, such as economics or sociology, are problematic, since the changing norms and practices of individuals and societies may also be held to be constitutive factors in kind membership, and these norms and practices may themselves respond to the classification of people into kinds (Stanford Encyclopedia of Philosophy 2017). That way, evaluation of taxonomy’s utility is difficult, since there isn’t a recognized standard criterion. However, Wiegmann and Shappell (2005) have suggested that for an error check framework for taxonomies to be successful it should be able to satisfy the following main requirements or product criteria among others:

Comprehensiveness. For any given taxonomy it is important to consider whether the framework is able to cover all of the relevant variables that it purports to cover. In the current context this means that it should cover all the relevant categories related to the individual error event and its surrounding context. It also important that the framework is able to analyse both normal and abnormal situations since important lessons about error management might be obtained by not only focusing on critical events, but also normal everyday events where most errors are prevented from developing into serious consequences (Helmreich et al. 2001). Even though it is important that the framework is able to capture all relevant categories it is at the same time also important to avoid irrelevant categories (Wiegmann and Shappell 2002). The proposed taxonomies were revised by industry experts to align researchers’ categorization skills with practitioners’ expertise (Appx VII and XI).

Contextual factors. Since errors and their capture do not happen in a vacuum but in the interaction between people and the general work environment - including the technological, psychosocial and organisational context - it is critical that the framework is able to capture the dominant characteristics of the context that affects performance. The proposed taxonomies offer some terms to belong to different groups considering the potential context.

COVID-19 impact. Comparing results from pre/post survey gave authors a unique opportunity to see how the external factor (COVID-19) influenced the value adoption. Surprisingly, the results show that recent dramatic change in circumstances (COVID-19) has little affected the participants' general idea on value proposition in air transportation; in particular health value was not explicitly mentioned (8 terms were named) and seems to have been simply accepted as a "new reality". The hypothesis is that it is due to overly positive view (such as happened after WWII - baby boomers; art, style, and culture dramatic liberalization). However, the sampling is biased to participants that closely related to transportation area as well as age (millennials); this might not generalize to wider population and e.g., the overly negative reaction might be possible as was the case after WWI reflected in the phenomena like Lost Generation or Dadaism.

Benefits for the industry. These taxonomies are extremely useful for the following purposes: to understand the essence and systematization of services / services, to formulate KPIs by directions, to distribute areas of responsibility between all the links in the value chain. Also, the unexpected finds and formulations of values that were not previously in sight are of great interest for marketers. Good perspective can be seen in using VP taxonomy in Project Management.

5.2.2 Reflection on Value shift

Value shift is one of the mainstream trends in today's economy. A commitment to sustainability calls for paying more attention to the environment protection and low resources consumption, as well as strong human rights standards set the course for diversification and tolerance.

Automation of value identification and expansion utilises start-ups as a source of data. The novel start-up values allow investigating if consumers' demand for the industry represents what (Schwartz 2012) called universalism value? Recent shifts in values, supported by United Nations, away from entertainment and toward social responsibility, from consumerism to eco-friendliness, and away from one-day-objectives toward sustainability turn researchers toward the discussion of humans as rational agents. One of this research aims is to explore how and to what extent value shift from individual to group values is reflected in the values consumers expect from the air transportation industry.

The semantic analysis of values disclosed by Air Transport Value Taxonomy that group values consist 4.5% of all the values which is reflected in Table 24.

Table 24. Individual and Group values (author)

Air Transport Value Taxonomy	
Good-for-you (individual) values	Good-for-all (group) values
Examples: Private 7 Flexibility 6 Customizability 2 Adjustable Worldwide 5 Accessibility 2 24/7 1 Transfer 2 Customer Management 1 Check-In Skips 1 Clean Airplane 1 Automate Customer Service 1 Treat Customers 1 Without Fanaticism 1 Less Formality 1 Minimum Time Passage 1 Total: 747 values	eco-friendliness 22 low-emissions 1 co2-friendly 1 small emission 1 a commitment to sustainability and to acting in an environmentally friendly way 1 environment friendly 1 less air pollution 1 green 1 minimum fuel consumption 1 fuel efficient 1 zero-fuel aircraft 1 fuel capacity 1 socially friendly 1 LGBT friendly 1 Total: 35 values

Despite the fact that the majority of respondents were young people who are defined by their preaching of values such as concern for society, minorities, and the environment, the percentage of respondents who shared group values was rather low. Of course, one may argue that this proportion is greater than zero. However, there has been no research into aviation values, and so there is no possibility to compare it against.

But if to consider more general studies and pay attention to universalism - understanding, appreciation, tolerance, and protection for the welfare of all people and for nature (Schwartz 2012) - then the results of these studies indicate the modest role of group values (universal) for respondents. For instance, in 2019 160 Austrian university students reported their political orientation and completed a value survey for themselves (Gluck et al 2019). Figure 39 provides the results of the survey with universalism included.

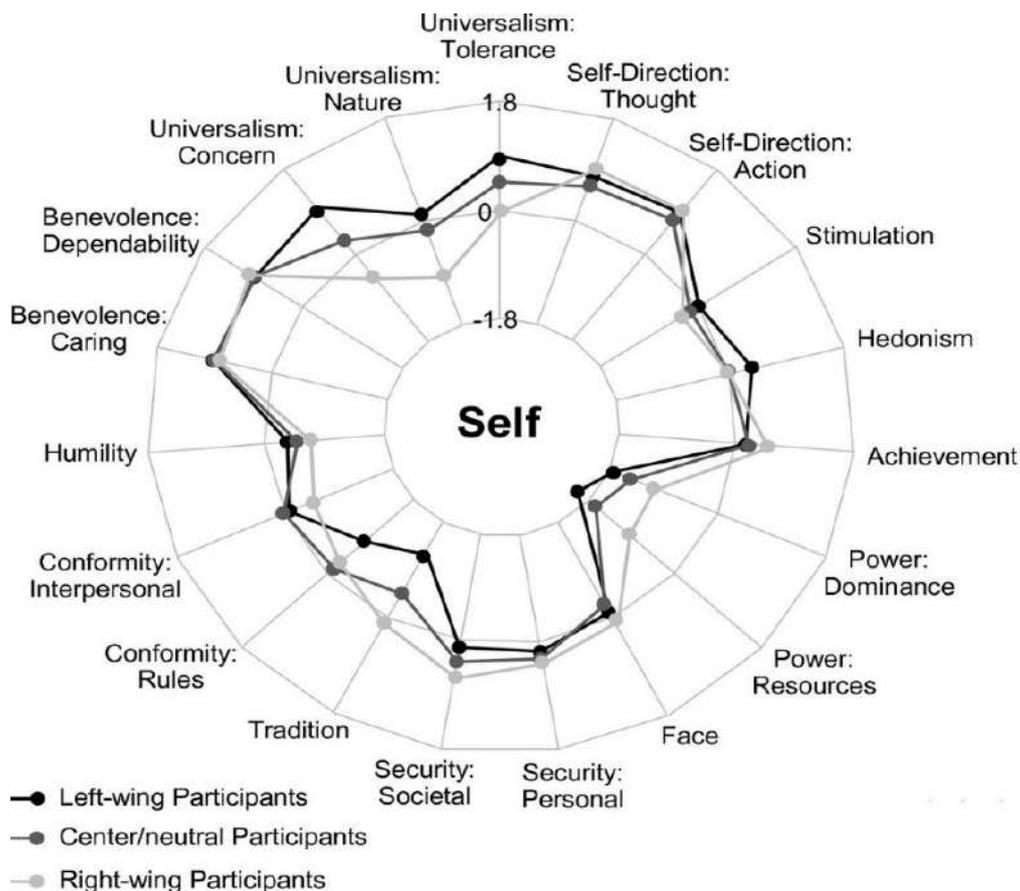


Figure 39. Value orientations reported by left-wing, center-neutral, and right-wing participants for themselves (Gluck et al 2019)

Despite the different survey methods and specific (aviation) versus general (self) domain, the results were similar. The difference in survey methodology underscores the importance of similar findings. In the case of a survey of the values expected from aviation, the respondents themselves formulated the values, not referring them to one or another semantic category previously formulated by the interviewers, for example, "ecology". Therefore, the respondents could not form an opinion under the influence of the names of the categories. They might not mention group values at all.

In the case of a survey of Austrian students in 2019, respondents expressed in advance their attitude to the already formulated values, one of which was universalism. What could have influenced their choice of answers, made them think about how to evaluate socially approved concepts.

Perhaps, the value shift from individual to group values is not yet so obvious. The following studies can be aimed at elucidating the dynamics of the transition from individual values to group values: is such dynamics really traced and how it will manifest itself in the future.

Due to the reason that various industries use different terminology and may have varying foci, the use of the obtained data is limited by air transportation industry. This limitation is applicable to particular data and their categorizations. However, this restriction does not apply to the process for automated value identification. This method is applicable to all industries. Additionally, the data collected can be used in linked transportation industries due to the similar nature of the customer expectations.

5.2.3 *Practical Importance and Industry Reviews*

Three air transportation industry experts of a high level of expertise - two commercial directors of international airports and one IT head manager of the major airline - were asked to compare the developed Value Proposition taxonomy with IATA Airline taxonomy. They also shared their ideas about the way taxonomies can be useful for industry and COVID-19 surprisingly little significance from respondents in April, 2020. Below there is a summary of the experts' review:

IATA and Value Proposition taxonomies difference. Value Proposition taxonomy focuses on innovative values, reflects consumers' requests for new technologies and attributes like speed, super-sonic, unmanned. IATA taxonomy is more conservative. Also, IATA AT offers top-down approach where taxonomy was created by a governing body and reflects the aviation industry ideas on products and services, while Value Proposition is created using bottom driven approach asking what consumers' wants and needs are.

COVID-19 and consumers' expectations. Based on conducted interviews, industry representatives and annotators admit that the inertia plays a great role in such conservative industries as air transportation. Consumers may still not realize their expectations for health issues. Also, little attention towards COVID-10 could be due to the well-known fact that in a pandemic, all industry participants (airports, airlines, handling companies, etc.) give priority attention to the safety issues for the health of passengers and employees; therefore, by all passengers / clients (including respondents), this is already taken for granted (the must) and is no longer perceived as a value (added value). A copy of annotators reviews is provided in Appendix VI.

Air Transportation industry experts' reviews:

International Hub Airport Commercial Director: "The unexpected finds and formulations of values that were not previously in sight are of great interest for marketers. Good perspective can be seen in using aviation values taxonomies in Project Management"

Airline IT Head Manager: “These taxonomies are extremely useful for the following purpose: to understand the essence and systematization of services / products. Our company has used a unique Semantic Taxonomy of Values in Aviation while developing our new online check-up and shopping system”

Commercial Director of Reginal International Airport: “Automation and systematization of values in air transportation allows for faster decision making on strategic questions as it shows new values and value chain transformation; taxonomies enable to formulate Key Performance Indicators by directions, to distribute areas of responsibility between all the links in the value chain.”

Summarizing practical importance and industry reviews, the following can be concluded:

1. Strategic decision-making scope is widened by providing extended choice of values based on innovations and novel business models.
2. Taxonomies allow elaborating common language for new concepts; provide consistent data for identification, comparison, and analysis.
3. Automation provides opportunities for identification industry value shift through time and new values can be documented using time- and resource-saving technique
4. Novel methodology has a potential applied to different domains enabling identification and extending values beyond air transportation.

A letter containing *Expert Review* on automatic value identification and extension concept and developed taxonomies can be found in Appx X.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study has been designed to help companies use the potential of data processing to create new data-driven decision support systems in the process of developing a value proposition. *The research aim to develop a methodology for automatic identification and expansion of values in the domain of air transport* has been achieved, and methodology has been elaborated.

The main research question Can values be identified, and number of values be increased automatically? has been answered affirmatively.

Five chapters of this Thesis have developed new methodology of value as part of value proposition identification and extension as well as a model and show how these allows to yield concrete results in the automation of the process of value identification and extension.

To prove the usability of the value automatic identification and expansion, modern perspectives on the deployment of data-driven business processes have been discussed. The benefits of utilizing data analytics adopting Natural Language Processing approach and text mining techniques to enhance business performance have been demonstrated: time- and effort-saving. Reviews from leading industrial analysts have been provided, including insights on the advantages of a digital strategy for business processes and implementation of data-driven decision-making support systems:

- automation and systematization of values in air transportation allows for faster decision making on strategic questions
- taxonomies are extremely useful for the following purpose: to understand the essence and systematization of services / products
- this research has focused on developing value proposition as the part of the business processes of the company and this perspective is meant in the next chapter which creates a theoretical framework for value proposition and values as its components and presents a case study of air transportation values
- the unexpected finds and formulations of values that were not previously in sight are of great interest for marketers
- taxonomies enable to formulate Key Performance Indicators by directions, to distribute areas of responsibility between all the links in the value chain.

To achieve the goal of the research, the modern concept of value proposition and values as part of this concept was examined. The idea of a separate value as a component of value proposition has not yet been established in the scientific community, so the author deduces the etymology of the notion of "value" into the concept of value proposition, explores research on value before the concept of value proposition appeared and analyzes values in the air transport domain, since the air transport industry is taken as an example domain of the possibilities of automatic identification of values. The importance of novel and unique values is illustrated by the following conclusions:

- in the face of growing competition and air transportation liberalization, the role of a unique and novel value proposition in aviation is increasing and fast becoming a strategic priority.
- the traditional values in air transportation are price, quality and speed. In the recent decades, commercialization of air transportation initiates competition and, subsequently, new values search.
- value creation is one of the main company goals, and after the recent liberalization air transportation industry faces the unmet need of identifying new value proposition. Automatization of this process would be beneficial.
- to automate the process of value recognition, start-up companies present a decent data source for analysing value proposition since their goal is to grow and scale rapidly, information on their landing pages is open and actual.

Methodology, allowing automatic identification and expansion of values, was based on Natural Language Processing methods and introduced a novel task: to annotate values as entities from the texts. A new term was specifically created for value entity annotation - VER. VER combines two approaches: named entity recognition as value is treated as an entity, but semantics still has to be present as in Named Entity Recognition framework entities can typically be recognized by orthographic features, wherever value entity can be recognized semantically only, adopting binary approach: the word is either value or not.

Annotation technique is applied to the online texts containing values. One-word approach is conceptualized and applied to value categorization and implementing the classifier.

The specific results of the research are the following:

1. The corpus of values in air transportation consisting of 3 parts (survey, start-ups annotation and Twitter profiles annotation) was constructed and a Neural Network model was trained
2. One-word approach for capturing values in the texts was conceptualized
3. Two classifications of values in air transportation domain were constructed:
 - Air Transport Value Taxonomy, customer perspective
 - Semantic Taxonomy of Values in Aviation, industry perspective
4. Methodology of automated identification of values from texts is developed.

The final methodology of automated value identification includes the following steps: Exploratory data analysis, data source identification, text annotation, data systematization, and modelling.

The author views this work as a proof of concept, showing that there is a place for reasoning about automation for value identification and expansion and developing a model. The most immediate application of this tool is envisaged in air transportation companies developing new value proposition in the current challenging wellbeing and political environment.

Future research can be devoted to the following:

1. including different domains into the corpus of values
2. applying the resulted methodology through the certain periods of time aimed at obtaining time series of values to widen value metrics and to follow the value shift
3. to identify values from official regulations could provide some insights on official policies different viewpoints comparing to those of the industry.

Reproducibility of the research can be proven by the following the steps of methodology and acquiring the high degree of reliability through evaluating the results and accuracy.

Recommendations

Based on the results obtained, discussions with experts and conclusions, the author of this study has formulated the following recommendations:

- ***To decision-makers in the Air Transport domain***

Automatically identifying values as part of a value proposition is beneficial for significant reduction of the time and effort to comprehend existing values in the market and to discover new demand trends. Perspective can be seen in exploitation aviation

values taxonomies in Project Management to support the structured approach. Taxonomies enable to formulate Key Performance Indicators by directions, to distribute areas of responsibility between all the links in the value chain.

- ***To marketers in the Air Transport domain***

The wording of respondents' answers to open-ended questions about expected values from aviation supports to understand what and how the consumer expects from the air transport industry.

- ***To industry analysts***

Automatic valuation enables lower-cost analytical insights into the market in the context of the value proposition, strategic planning, and new products trends. Systematization in forms of taxonomies creates a common language for sharing concepts, allows to integrate information sources, grants knowledge discovery (patterns, trends), uncover visual patterns fit, compare and contrast new data.

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APPENDICES

Appx I Aviation English Bibliography

Table: Aviation English: Research Bibliography 2017-2021 (Source: the authors' construction)

Year	Article	Primary Focus	Keywords
2021	Laosirattanachai, P., & Ruangjaroon, S. (2021). Corpus-Based Creation of Tourism, Hotel, and Airline Business WordLists. <i>LEARN Journal: Language Education and Acquisition Research Network</i> , 14(1), 50-86	A lack of technical vocabulary is a major problem for English for Specific Purposes (ESP) learners in a foreign setting. In this paper, authors argue for using word lists to help learners expand their technical lexis repertoire. Therefore, authors propose English word lists in three disciplines constructed from compiled corpora - the Tourism Business Word List (TBWL), the Hotel Business Word List (HBWL), and the Airline Business Word List (ABWL) The three word lists were derived from the vocabulary and technical terms appearing in the Tourism Business Corpus (TBC), the Hotel Business Corpus (HBC), and the Airline Business Corpus (ABC)	corpus linguistics, hospitality word list, tourism business word list, hotel business word list, airline business word list
2021	Barakat, H., Yeniterzi, R., & Martin-Domingo, L., 2021. Applying deep learning models to twitter data to detect airport service quality. <i>Journal of Air Transport Management</i> , 91, p.102003	This research introduces a general framework for measuring Airport Service Quality (ASQ) using passengers' tweets about airports. The proposed framework considers tweets in any language, not just in English, to support ASQ evaluation. This work uses a large dataset including tweets in two languages (English, Arabic) from four airports. Also, to extract passenger evaluations from tweets, the framework applies two different deep learning models (CNN, LSTM) and compares their results. The two models are trained with both general data and data from the aviation performance	Sentiment analysis Deep learning Airport service quality ASQ Twitter
2020	Bo Li, Yixin Zhang and Zeshui Xu (2020). Limited interval-valued probabilistic linguistic term sets in evaluating airline service quality. <i>Journal of the Operational Research Society</i> , 1-17	To avoid information loss in the normalization process of PLTSs, this paper proposes the concept called limited interval valued probabilistic linguistic term sets (L-IVPLTSs) by introducing the membership degree. First, authors present the concept of L-IVPLTSs, and provide the basic operation laws and aggregation operators for L-IVPLTSs. Then, the membership degree is determined by the deviation degree based on a programming model. Furthermore, the extended possibility degree and the PROMETHEE II method under the limited interval-valued probabilistic linguistic environment are given, based on which, the whole multi-criteria group decision making (MCGDM) process with L-IVPLTSs is presented	Limited interval-valued probabilistic linguistic term sets; possibility degree; PROMETHEE II; multi-criteria group decision making; airline service quality evaluation
2020	Hwang, S., Kim, J., Park, E., & Kwon, S. J. (2020). Who will be your next customer: A machine learning approach to customer return visits in airline services. <i>Journal of Business Research</i> , 121, 121-126	This study aims to estimate the probability of customers' return visits to airline services using a machine learning approach on the received feedback comments and satisfaction ratings regarding the previous usage of the service. By considering the sentimental features in the comments with seven classifiers, the results show an accuracy of 83.42% for predicting the customers' return visits. A higher word count of feedback written by the customers can lead to a higher degree of prediction accuracy	Return visit Machine learning Review comment Airline service
2020	Messner, W. (2020). The impact of language proficiency on airline service satisfaction. <i>Journal of Travel & Tourism Marketing</i> , 37(2), 169-184	Language assumes a key role in the dyadic interaction between service providers and customers. When the provider cannot adjust its language to customers', such that customers do not receive the service in their primary language, they may perceive the service provider as dissimilar and unsympathetic, potentially leading to critical evaluations of the service experience. Within the context of the airline industry, this study demonstrates that when customers are being served in English and English is not their primary language, language proficiency affects their satisfaction with the service. National culture is a boundary condition of this effect	Airline industry; customer service and satisfaction; English language proficiency; linguistic alignment
2020	Zervina, O., Stukalina, Y., Pavlyuk, D., Rubens, N., (2020) Value	Primary purpose of companies is to create value; in aviation traditional dominant values are price, quality, and speed. New values are increasingly being adopted	Value proposition; air transportation, taxonomy, semantics

Year	Article	Primary Focus	Keywords
	Creation in Air Transportation: Beyond Price, Quality, and Speed. In <i>Reliability and Statistics in Transportation and Communication</i> . RelStat2020, 14-17 /10/ 2020, Riga, Latvia (p.119). Springer Nature	by companies to enhance their profitability and resilience. Companies delivering strong performances on more elements than competitors will attract more customers and can price higher than rivals do. In this research, authors investigate mechanisms for new values adoption. They aim at investigating value adoption by conducting annotations of 1,000 start-ups' landing pages in the field of air transport for identifying value proposition. Results have been analysed for linguistic and semantic identification: a Semantic Taxonomy of Values in Aviation as a semantic categorization was developed	
2018	Mizufune, K., & Katsumata, S., 2018, November. Joint Classification Model of Topic and Polarity: Finding Satisfaction and Dissatisfaction Factors from Airport Service Review. In <i>2018 IEEE International Conference on Data Mining Workshops (ICDMW)</i> (pp. 856-863). IEEE	This paper proposes a model developed based on Latent Dirichlet Allocation (LDA). It incorporates both a document dataset and the polarity of the document, for example, a positive and negative evaluation, as input data. In the empirical analysis, it was applied to international airport user reviews, in which the quality of services is evaluated. The results show that the proposed model can classify reviews into topics as effectively as the original topic model, and that its user evaluation forecasting ability is also good. Furthermore, this study examined the automatic generation of a polarity dictionary by the model	Airport service, reviews, dictionary, sentiment analysis
2017	Borowska, A.P., (2017). <i>Avialinguistics: the study of language for aviation purposes</i> . Peter Lang GmbH.	Book presents the first comprehensive description of avialinguistics. The author analyses this new interdisciplinary branch of applied linguistics that recognizes the role of language for aviation purposes. She provides an integrated approach to Aeronautical English and proffers insights into aviation discourse, discussing its current linguistic errors and providing suggestions for aviation English communication improvement	Aviation English Applied Linguistics Discourse Analysis

Appx II Evolution of Value Proposition

Table of Origins and Evolution of the Customer Value Proposition Concept (Payne, A., Frow, P., & Eggert, A., 2017)

Key literature and timeline	Contributions and findings
Value Proposition Concept	
Origins of the concept: Bower and Garda 1956; Lanning and Michaels 1955; Lanning and Phillips 1992	Bower and Garda briefly propose the concept of the value delivery system and the differentiating benefits of a product. They distinguish between what they describe as a physical process sequence, which involves simply making and selling a product, and the value delivery system, which involves choosing, providing, and communicating the value proposition. The choice of the value proposition involves what they term identifying customer value needs and value positioning.
	Lanning and Michaels provide an extended discussion of the value delivery system in a McKinsey & Co. staff paper. This early definition of a value proposition includes a statement of benefits provided and the total costs for a product. The paper focuses on the stages of choosing, providing, and communicating the value proposition. It provides examples of superior value propositions and an early version of a value map. The importance of different value segments is highlighted—a topic ignored in most subsequent literature on value propositions. Some 12 years later, the paper was published externally (Lanning and Michaels 2000). With its managerial focus, this paper emphasizes that a successful value proposition relies not just on the choice of value proposition but on “the thoroughness, single-mindedness, and innovation with which it is provided and communicated.”
	Lanning and Phillips, in a later Gemini Consulting paper, review some of the original concepts, focusing on uncovering and fully understanding the range of end-use benefits desirable to potential and current users. The importance of establishing value propositions aimed at key market segments is also emphasized.
Evolution of the Concept	
Value Disciplines and Value Proposition: Mid 1990s Treacy and Wierseina 1995	The value disciplines are distinct from value propositions; however, Treacy and Wiersema’s work heightened managerial awareness of both concepts. These authors argue that enterprises should choose among three generic value disciplines: product leadership; operational excellence; and customer intimacy. They assert that the choice of value discipline determines the structure and orientation of the business.
Value Maps and Value Propositions: 1996 Kainbil et al. 1996	Value maps identify strategies relating to the benefits and price of different competitive offerings and resulting CVPs. A value frontier incorporates the price/benefit positions of competitors within an industry sector, identifying strategies for extending or shifting the value frontier. Strategies for differentiating value propositions are addressed.
Development of Original Concept: Late 1990s Lanning 1998	Later work by Lanning proposes that an enterprise needs to define the dimensions of a value proposition by observing customers during their consumption experience. The modification of his original definition of the value proposition focuses on the whole set of resulting experiences that the customer has, including pricing considerations. In developing value propositions, Lanning proposes “becoming the customer” through the use of ethnographic engagement, rather than merely listening to customers.
Value Propositions and Customer Experience: early 2000s Smith and Wheeler 2002	Drawing on Lanning’s ideas, other authors place greater emphasis on customer experience in the context of value propositions. Smith and Wheeler contend that a branded customer experience is crucial to delivering a superior value proposition. They argue for the importance of focusing on the design and delivery of the customer experience for determining the critical dimensions of the value proposition.
Forms of Value Propositions: 2006 Anderson et al. 2006	Value propositions should focus on the key benefits that can be calculated to show superior value to chosen customer segments. Anderson and colleagues identify three forms of value propositions: all benefits, favorable points of difference (comparative benefits with key competitors), and resonating focus (key benefits for chosen segment).
Value Propositions and Customer Value Dimensions: late 2000s Rintamaki et al. 2007	Value propositions should include dimensions valued by customers that achieve competitive advantage. The four categories of value propositions include functional, economic, emotional, and symbolic. Any analyses should identify gaps between customers’ and suppliers’ perceptions of what is offered and experienced. This contribution extends the conceptualization of the value proposition to a network perspective.
Further Development of the CVP	
Reciprocal CVPs Ballantyne 2003; Ballantyne and Varey 2006a, 2006b; Ballantyne et al. 2011; Truong et al. 2012	Building on earlier work that acknowledges the benefits of value propositions accruing to both the enterprise and the customer, Ballantyne (2003) emphasizes the two-way reciprocal nature of value propositions. Ballantyne and Varey (2006a) and Truong et al. (2012) recommend that stakeholders work together to achieve propositional engagement. Later Ballantyne et al. (2011) provide some examples of two-way reciprocal value propositions crafted for both customers and other stakeholders.
Cocreated Value Propositions Ballantyne 2003; Lusch and Vargo 2006; Payne et al. 2005; Kowalkowski et al. 2012	Ballantyne (2003) appears to be the first author who argues for cocreation of value propositions. Later, Lusch and Vargo (2006) identify cocreation of the value proposition as a key component of the service-dominant logic. Emphasis shifts to an exchange of benefits and sacrifices that are encompassed within the overall relationship value and ongoing customer relationship. Payne

Database of start-ups used for annotation from (CrunchBase, 2020)

1. 1sec.html"
2. a³-by-airbus.html"
3. able-engineering-ponent-services.html"
4. ac-global-medical-transports-3.html"
5. acro-aircraft-seating.html"
6. acumen-aviation-europe.html"
7. advanced-manufacturing-research-centre.html"
8. aegean-airlines.html"
9. aena.html"
10. aercap.html"
11. aerial-hotshots.html"
12. aerinx.html"
13. aero-11d2.html"
14. aeroandina.html"
15. aerobotika.html"
16. aerobotika-aerial-intelligence.html"
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19. aerocare.html"
20. aerocentury.html"
21. aero-corporation.html"
22. aero-dienst.html"
23. aeroguard-flight-training-center.html"
24. aeroinformatic-ai.html"
25. aerolínea-de-antioquia.html"
26. aeromexpress.html"
27. aeronova.html"
28. aeronyde-corporation.html"
29. aerospacecraft.html"
30. aerospacecraft.html"
31. aerospace-aviation-services.html"
32. aerospace-software-developments.html"
33. aerotek-manufacturing.html"
34. aerotranz-smart-flying-for-everyone.html"
35. aeroturbine.html"
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37. aerounion.html"
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39. aevex-aerospace.html"
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43. air-alliance.html"
44. air-alliance-gmbh.html"
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69. air-inuit.html"
70. air-italy-spa.html"
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74. airlift-one.html"
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78. air-logistics-group.html"
79. air-malta.html"
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83. airnguru-s-a.html"
84. airning.html"
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 356. garuda-indonesia.html"
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 374. green-tech-aircraft.html"
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 405. iberia-express.html"
 406. icm-hub.html"
 407. idaero-sl.html"
 408. iforce-group-ltd.html"
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 451. kidmoto.html"

452. kilimanjaro-airports-development-pany.html"

453. kitty-hawk.html"

454. kiyavia.html"

455. klm-cargo.html"

456. korean-air.html"

457. koster-ag.html"

458. l2-aerospace.html"

459. landmark-global-inc.html"

460. lastseat-ltd.html"

461. laudamotion-gmbh.html"

462. leading-edge-aviation.html"

463. legalfly-llc.html"

464. leo-341b.html"

465. liberty-jet-management.html"

466. lifemiles.html"

467. lineas-aéreas-del-estado.html"

468. lineas-aereas-privadas-argentinas.html"

469. lmi-aerospace.html"

470. lobo-leasing.html"

471. logican.html"

472. london-executive-aviation.html"

473. lorraine-travel.html"

474. lowcost-airpost.html"

475. lunajets-sa.html"

476. luxair-s-a.html"

477. luxaviation.html"

478. luxembourg-airport.html"

479. luxury-aircraft-solutions-inc.html"

480. lynx-software-technologies.html"

481. magnetic-mro.html"

482. magnix.html"

483. malindo-air.html"

484. manchester-airport-group.html"

485. mango-airlines.html"

486. mapacero.html"

487. mas-logistics.html"

488. masterjet.html"

489. max-viz.html"

490. maxwell-innovations.html"

491. mecanizaciones-aeronáuticas.html"

492. memberjets.html"

493. menzies-aviation.html"

494. metlab-miljö.html"

495. microship.html"

496. migacore-technologies.html"

497. misterfly.html"

498. modern-aviation-inc.html"

499. modern-logistics.html"

500. monarch-air-group.html"

501. mon-avion.html"

502. morrison-expressrporation.html"

503. mountain-flyers.html"

504. mr-freeze-refrigeration.html"

505. mustang-helicopters.html"

506. myairseat.html"

507. naco.html"

508. national-airways-corp.html"

509. nats.html"

510. navcanatm.html"

511. nc-software.html"

512. neoptera.html"

513. neos-s-p-a.html"

514. network-aviation.html"

515. newleaf.html"

516. new-united-goderich.html"

517. nexustld.html"

518. nexus-systems-israel.html"

519. nft-corporation.html"

520. nhv-group.html"

521. nice-cote-d-azur-airport.html"

522. nicholas-air.html"

523. no-1-traveller.html"

524. nordwind-airlines.html"

525. nortec-parts.html"

526. north-cariboo-air.html"

527. north-dallas-aviation.html"

528. north-star-air.html"

529. north-star-aviation-mankato-mn.html"

530. notarin-motors.html"

531. nouvelair.html"

532. novolabs-net.html"

533. nowports.html"

534. nray-services.html"

535. oceancare.html"

536. ocean-care-forwarders-pvt-ltd.html"

537. oman-aviation-servicessaog.html"

538. omni-air-international-oai-2.html"

539. omni-helicopters-international.html"

540. onair.html"

541. oneaire.html"

542. onejet.html"

543. onesky-flight-llc.html"

544. oneweb-satellites.html"

545. online-truckers.html"

546. openairlines.html"

547. openjet.html"

548. oreyeon.html"

549. oriental-logistics-pany.html"

550. ottawa-international-airport-authority.html"

551. pagnie-aérienne-inter-régionale-express.html"

552. pakistan-international-airlines-corp.html"

553. pal-v.html"

554. panchmukhi-air-ambulance.html"

555. paramount-airways.html"

556. park-aerospace-corp.html"

557. parts.html"

558. pascan-aviation.html"

559. pass-jet.html"

560. pawan-hans.html"

561. pcm-innovation.html"

562. pdg-helicopters.html"

563. pdm-transportation.html"

564. peach-aviation.html"

565. pefect-point.html"

566. penn-yan-flying-club.html"

567. penobscot-island-air.html"

568. phoenix-east-aviation.html"

569. phptravels.html"

570. piedmont-airlines.html"

571. pilota.html"

572. pipistrel.html"

573. planeenglish.html"

574. plane-parts-360.html"

575. planeta-otimo.html"

576. plete-environmental-solutions.html"

577. pmweb.html"

578. pointhub.html"

579. popflight.html"

580. populetic.html"

581. ppg-aerospace.html"

582. premiercars-and-couriers.html"

583. premier-private-jets.html"

584. proavia.html"

585. professional-flight-management-systems.html"

586. provincial-aerospace.html"

587. prox-dynamics.html"

588. psa-airlines.html"

589. pt-dirgantara-indonesia-indonesian-aerospace.html"

590. pt-garuda-indonesia-persero-tbk.html"

591. punta-cana-now.html"

592. puro-ventures-ltd.html"

593. pyka.html"

594. qatar-airways-cargo.html"

595. qualisrporation.html"

596. quantum-ai-aerospace-space-defense-advanced-military-systems.html"

597. quantum-jets-llc.html"

598. radixx-international.html"
599. rangel-group.html"
600. ravn-alaska.html"
601. raymond-express-international.html"
602. reach-technologies-889c.html"
603. redbird-flight-simulations.html"
604. redline-aviation-security.html"
605. regional-express-ltd.html"
606. renegade-materialsorporation.html"
607. renluftsteknik-i-goteburg.html"
608. retail-inmotion.html"
609. rico-linhas-aéreas.html"
610. rma-5724.html"
611. robostate.html"
612. rochester-airport-transportation.html"
613. rocketroute-ltd.html"
614. rossiya-airlines.html"
615. rotorcraft-leasing-pany.html"
616. route-dynamics.html"
617. royal-jordanian-airlines.html"
618. royal-pacific-air.html"
619. rvmagnetics.html"
620. saam-9712.html"
621. safeconnect.html"
622. safe-fuel-systems.html"
623. safety-line.html"
624. san-francisco-auto-transport.html"
625. sas-group.html"
626. satavia.html"
627. sats-ltd.html"
628. saturn-freight-systems.html"
629. saudia-airlines.html"
630. saxonair-charter.html"
631. schiebel.html"
632. scoutlogistics.html"
633. searcharter-ltd.html"
634. seat-amigo-inc.html"
635. seatassignmate.html"
636. seatfrog.html"
637. seer-aerospace.html"
638. selfly.html"
639. sentient-jet.html"
640. sero-systems.html"
641. set-jet.html"
642. sgd-engineering.html"
643. shanghai-pudong-international-airport.html"
644. shannon-airport.html"
645. sigma-software.html"
646. silver-airways.html"
647. sim-aviation-training.html"
648. simtech.html"
649. simtech-aviation.html"
650. sirius-aviation-capital.html"
651. sixt-my-driver.html"
652. skeyes.html"
653. sky500.html"
654. sky-air-ambulance.html"
655. sky-airline.html"
656. skyguru.html"
657. skyhi.html"
658. skymax.html"
659. skyryse.html"
660. skyselect.html"
661. skyservice-business-aviation.html"
662. skytrails.html"
663. skytrails.html"
664. skytrax.html"
665. skyvantagerporation.html"
666. skywest-inc.html"
667. smbc-aviation-capital.html"
668. sogclair-aerospace.html"
669. solocate.html"
670. south-african-airways.html"
671. sr-technics.html"
672. srx-transcontinental.html"
673. star-flyer-inc.html"
674. star-quality-airnditioning.html"
675. starspeed.html"
676. stellar-labs.html"
677. strategic-air-finance.html"
678. sunaero.html"
679. sun-d-or-international-airlines.html"
680. surf-air.html"
681. swedavia.html"
682. swedavia.html"
683. swiftair.html"
684. swoop-aero.html"
685. sydney-airport.html"
686. tamarack.html"
687. tampa-international-airport.html"
688. taneja-aerospace-and-aviation.html"
689. tap-air-portugal.html"
690. tapjets-inc.html"
691. tarmac-aerosave.html"
692. tarmac-technologies.html"
693. taturobotics.html"
694. tav-airports.html"
695. team-accessories.html"
696. team-worldwide.html"
697. technology-service-corporation.html"
698. terminal-velocity-aerospace.html"
699. tetra-aviation.html"
700. thc.html"
701. thcinc.html"
702. the-air-travel-group.html"
703. the-carbon-freight-pany.html"
704. the-owners-of-n1541x.html"
705. tiket2.html"
706. tmalogistics.html"
707. tmt-aerospace.html"
708. total-energy-service.html"
709. total-quality.html"
710. travel-management-co.html"
711. travelright.html"
712. travelskope.html"
713. travers-aviation-insurance.html"
714. trax-usa-corp.html"
715. tripcast.html"
716. trippie.html"
717. triptrotters.html"
718. ttfly.html"
719. ttfly.html"
720. tuki-jets.html"
721. tunisavia.html"
722. turbineaero.html"
723. turbine-solutions.html"
724. turbo-air.html"
725. tyvak.html"
726. ua-freight-services.html"
727. ubc-gmbh.html"
728. ub-posites.html"
729. udchalo.html"
730. uk-atlantis-removals-storage.html"
731. ukraine-international-airlines.html"
732. ulterius-aviation.html"
733. ultimate-jetcharters.html"
734. unifreight-international.html"
735. unipost.html"
736. united-continental-holdings.html"
737. ural-airlines.html"
738. us-general-shipping.html"
739. uzbekistan-airways.html"
740. vanguard-airlines.html"
741. vantage-airport-group.html"
742. varig-airlines.html"
743. varionix-gmbh.html"
744. växjö-småland-airport.html"
745. venezolana.html"
746. venezolana.html"
747. victor.html"
748. victor-forward.html"
749. vietjet-air.html"

750. vigilant-aerospace-
systems-inc.html"
751. vip-transportation-
group.html"
752. virgin-atlantic-
airways.html"
753. virgin-australia.html"
754. vistair.html"
755. vitatoc-aviation.html"
756. vola-ro.html"
757. volocopter.html"
758. volotea.html"
759. voltrans-logistics.html"
760. voom-2.html"
761. vrco-ltd.html"
762. vueling-airlines-s-
a.html"
763. wadia-group.html"
764. wadiagroup.html"
765. wamosair.html"
766. wasaya-airways.html"
767. waterfront-air.html"
768. webcargonet.html"
769. weflock.html"
770. weststar-aviation.html"
771. west-star-aviation.html"
772. west-wind-
aviation.html"
773. wfs.html"
774. wheels-up.html"
775. whilefly.html"
776. wholesale-flights.html"
777. williamsburg-flight-
center.html"
778. winding-tree.html"
779. wisanamitra-
argakarya.html"
780. wis-logistics.html"
781. wizz-air.html"
782. woollip.html"
783. world-net-logistics-
pty.html"
784. wowair.html"
785. wrg-ag.html"
786. wright-electric.html"
787. xiamenair.html"
788. xl-airways.html"
789. xti-aircraft-pany.html"
790. youngjets.html"
791. zaphod-
corporation.html"
792. zeleros.html"
793. zeotech.html"
794. zip-speed.html"
795. zipspeed.html"
796. zunum-aero.html"

Appx IV Pre-survey Data

Pre-survey values, raw data

0 quality:speed:eco-friendliness
1 safety
2 safety::speed::
3 system stability:performance:ecological:
4 comfort:safety:noise reduction:food menu:hd tv:isolation of passengers with children :wi-fi:personal parachutes::
5 speed: comfort: more destinations
6 speed
7 responsibility:collective:convenience :comfort :safety:
8 affordability:comfort:tickets accessibility:internet accessibility:good service:percise arrivals
9 cheap prices:comfort:safety:huge choice:polite staff:passenger loyalty:airport location:huge aircraft selection:pretty interior:clean airplane
11 innovative:professional:cheap:effective:exotic
12 high speed:high capacity:low cost
13 affordability:quality:speed:safety:
14 efficiency:no geographical obstacles:reliability:monitoring:minimum passage of customs procedures:minimal fuel consumption:
15 efficiency:speed:performance:swankiness:coolness:brevity:virality:convenience:ease of use:abundance of cup holders
16 organizes:quality:opportunity:reduces risk:reduces cost:variety:informs:reduces effort:offers:save time:speed:attractiveness:simplifies:connects:design:entertainment:low emissions:sales:
17 0
18 speed:quality:expenses:collective:
19 cheapness:accessibility
20 ok:
21 route variability
22 safety:speed:availability:comfort:reliability:affordability
23 trustworthy:comfort:easy to pay:speed:partners:ranking:safety:good service:easy check-in:internet:entertainment:
24 affordability:quality:speed:comfort:health safety
25 speed:comfortable:cheap::
26 flexibility:price:design:application:free goods:quickness
27 comfort:safety:more hang luggage weight:more food offered on the plane:
28 fast service :friendliness :politness :
29 low-price:punctuality:leisure:family friendly:gastro:business:individual approach:private:ergonomic seats:super-sonic:direct:vip:oversized baggage:oversized-cargo:multimedia:satellite-connected:co2 friendly:nordic:paperless:domestic:traditional:premium:fuel-efficient:all-weather:direct/connection-less:::::
30 variety:simplifies:design:reduces costs:comfort:organizes:save time:informs:offers:
31 safety:comfort:speed:on-board entertainment:new types of aircraft:cheaper tickets:more destination points
32 safety
33 low cost: safety: fast: quality
34 comfort:telephone connectivity
35 cost reduction:flights extension
36 affordability:quality:speed:eco-friendliness:
37 comfort:low prices:quality planes:place of worship:no hassle:many destinations:good luggage handling:wi-fi:speed:humane pet transportation:safety

38 comfort:quality:speed:affordability:carrying capacity:pet friendly
39 agility:team culture:flexibility:unique experience:diverse responsibilities:professional:work from
home:
42 futuristic design:small emission:5g internet:comfort:wide range of food:positive staff:friendliness:
43 comfort:affordability:easy-to-use:quality
44 1)remaking airplane cabin from seating places to standing places for bigger people capacity.:2)to
invent some safety capsule with parachute. for example if airplane inevitably fall down we can save passengers
and cabin crew team life by bailout this capsule.:
45 comfort:cheapness:availability:flights each 2 hours:
47 price:
49 safety: value
50 cheapness: safety: convenience of airports
51 comfort:speed:affordability
52 t1:t2
53 a commitment to sustainability and to acting in an environmentally friendly way:*they should be
innovative:they should show excellence in work
54 quality:cost
55 reliability:speed
56 comfort :cheap prices:safety :less baggage instructions :wi-fi connection in aircraft :free lunch
:smoking:quality of food:more space in the plane:pillows : :
57 quality:safety:speed:eco-friendliness:affordability:avoids
hassles:reputation:trustworthiness:innovations:flexibility:sustainability:personalization:alternative
approach:diversification:unique experience:progressive:versatility:positive attitude:creativity:philanthropy
58 quality: affordability: speed: safety.
59 safety:affordability:accessibility:comfortability::
60 fuel economy:better flight organization:
62 cheapness:comfort:availability:less formality:easy check-out:easy examination
63 efficiency:no geographical obstacles:reliability:monitoring:minimum passage of customs
procedures:minimal fuel consumption:
64safety:cheap:food:comfort:quality:toilet:speed:choices:clean:illuminator:service:location:communica
tion:scheduling:developing:new airplanes:wi-fi:collaboration:
65 ease of transportation:wi-fi:
66 innovation;;improve employee motivation ;;speed;;work copy : paste
67 comfortable:speed:cheaper:ecologic:
68 speed
69 save:quality:speed:cheapness:
70 comfort:cheap tickets:airplanes:more bag:transfer :motel:free food :lgbt friendly:free wifi:more
toilets:sleeping places
71 speed: height: weight: size
72 safety:number of destinations:ticket cost:comfort inside of the plane:service
quality:entertainment:speed:luggage control:
73 speed:safety:comfort:save time:food:beauty of sky:friendly stuff:high quality pilot:quality:
74 punctuality: quality service: price of service: scale: brand: safety
76 speed: affordability: low-cost: quality
77 free miles:comfort:transfer:vegan menu:sleeping places:
78 baggage safety:politeness:punctuality:good-quality food:worldwide:pillows
79 understandable:user-friendly:reliable:unique:competitive:high-standard:affordable:
80 engine:speed:quality of service:quality of airplane:comfort:friendly workers:cheap food :
81safety:cheap:food:comfort:quality:toilet:speed:choices:clean:illuminator:service:location:communica
tion:scheduling:developing:new airplanes:wi-fi:collaboration:
83 certification:innovativeness:reliability:sociality
84 legroom
85 safety:affordability:quality:internet communication:high speed jets

86 speed:safety:confidence
87 affordable quality: speed: customer management: employee management: employment quality:
progress & growth training structure: structural overall benefits: information gap between airlines: ground
service companies: baggage delivery services: innovations & infrastructure: in-flight services
88 quality:speed:affordability:health safety:comfort:
89 low cost:environment friendly:more affordable:new design:free wi-fi:comfortable:less air
pollution:no child on-board:free internet on-board
91 affordability:quality
92 price:ecology:service:aircraft improvement:advanced materials:pushing the boundaries:zero-fuel
aircraft:structural health monitoring:advanced space propulsion technologies:smart automation and
blockchain:in-flight entertainment and connectivity:visionary concepts
93 fly safety:comfort:services availability:system stability:speed of planes
94 speed:
96 security:comfortability:quantity
97 affordability: quality and speed
98 speed:
99 quality:speed :safety:modern:comfortable:being available:socially friendly:
101 quality:fast service:security:affordable
102 safety:comfort:more space:individual approach:confidence
103 price:support:flying
quality:comfort:service:trust:passion:leadership:teamwork:customers:responsibility:involved:innovative:smile:
104 affordability: quality: speed; less typical: eco-friendliness.
105 speed:quality:safety
107 brand value:: safety: : innovation: :affordable cost: : legal policy
108 speed:
109 affordability:safety:quality
110 affordability: quality: speed
111 capacity of bombs on a board:comfort :fuel-capacity:sleeping places:safety:quality of
pilots:internet :price:microsoft license :quality of food on a board::
112 quality:affordability:creativity:
113 modern:effective:cheapness
114 affordability:quality:speed:eco-friendly:strongest:safety:innovative:revolutionary:future headed
115 speed
116 convenience:reliability:eco friendly:beneficial:convenient schedule:modern
117 safety:confidence:speed:accuracy
118 flexibility:price:design:application:free goods:quickness
119 speed:ecological:comfort:purity:delicious food:navigation :easy reference point :affability :safety
:treat customers without fanaticism
120 speed:comfort:safety:unusual:availability:4g:ecological:
121 safety; affordability; quality; punctuality; adaptability.
122 comfort
123 affordable:fast service:safety:quality service:
124 quality:affordability:speed:ease of use:customizability:support:uniqueness
125 original idea:best decisions:convenient:interesting:cheaper:wi-fi:new design:safety:friendly
staff:friendly interface
126 safety:efficiency:mobility:quality:eco-friendliness:price value:capacity:innovation:customer
service
127 price:comfort:exclusivity:customer
choice:transparency:fun:remarkable:credible:extraordinary:fearless:reliable internet
connection:supportive:continuous improvement:responsibility:passion:loyalty:

Post-survey values, raw data

- 1 speed:quality:safety:responsiveness
- 2 test online:val2:val21
- 3 quality :cost:comfort:speed:affordability:eco-
friendliness:time:safety:performance:reliability:support:security:efficiency
- 4 cheap:comfortable:fast:eco friendly:modern:technological:professionals:number
one:perfect:affordable:personal:convenient:simply
- 5 speed:safety:quality:interesting design
- 7 saas:innovative:fuel-efficiency:predictive:cloud-
based:personal:adjustable:individual:luxury:super-sonic:up-
sale:digitized:innovative:outsourced:dynamic:reliable:multi-modal:world-class:people-friendly:ai-driven:low-
cost:high-capacity:seamless:point-to-point:compact:light-weight:paperless:electronic:connectivity:safety:it
security driven:hybrid::
- 8 safety:punctuality:attentiveness:automate customer service
- 9 safety:speed:cheapness:privateness:
- 10 fast: simple to use: innovation (engineering): new (ways): higher customer expectations:
cheapness: safety
- 11 speed:quality:safety:responsiveness
- 12 innovative:safe:easy:professional:comfortable:best:fastest:experienced
- 13 affordability: quality: speed: employee and customer management .
- 14 friendliness:cheapness:innovativeness:popularity:cooperation:interest:openness
- 15 safety:cheapness
- 16 affordability:quality:speed:eco-
friendliness:service:simplicity:convenience:speed:reliability:safety:luxury :inventiveness:innovation:
- 17 baggage control:worldwide:meal:sleeping places
- 18 strength: quality: speed; affordability: eco-friendly: corona
- 19 test:and some more:asdfd adfd:
- 20 eco-friendliness:health help:planning :working from home:flexibility :creativity
:innovation:autonomous:highly resourceful:investigate:explore:worldwide:logistics skills:it skills:management
skills:responsibility:modern law:understanding generational requirements
- 21 affordability:quality:speed:eco-
friendliness:save:careless:scalable:exciting:breathtaking:adventure:innovation:curious:fun:trust:
- 22 smart:flexible:autonomous:cheap:private:eco-friendliness:efficient
- 23 quality:affordability:ease of use:speed:unique:benefits
- 24 safety:affordability:quality
- 25 affordability:efficiency:comfort:speed:quality:eco-
friendliness:reliability:support:variability:services
- 26 design:efficiency:cost per trip:staff:attitude to people:necessity:
- 27 eco-
friendliness:quality:service:speed:affordability:simplicity:convenience:importance:usefulness:usability:luxury:
- 28 safety:reliability:convenience:integrity:innovation
- 29 speed and quality
- 30 affordability:quality:speed:friendliness.
- 31 quick:fast:cheap:unique:green:virus-safe:smart
- 32 safety:security:on-board disinfection
- 33 relaxing:simple:ckeck-in skips:smarter aviation:human flights:moder transportation:effective
transportation:
- 34 comfort:speed:safety:cost
- 35 safeness:speed:comfort :easy:convenient:
- 36 comfort:private:safety:experience:professional team

- 37 solutions:services:comfort:quality:safety:experience:private
- 38 speed:saving money:new technologies:ease of use:
- 39 innovative:professional:brand-new:cheap:fast:quick
- 40 a commitment to sustainability and to acting in an environmentally friendly way.a commitment to innovation and excellence.a commitment to doing good for the whole.a commitment to helping those less fortunate.a commitment to building strong communities.
- 41 high standard:affordable:user-friendly:low cost:high speed:modern:competitive:attractive:supportive
- 42 reduce costs:increase profits:customer satisfaction:safety:unique experiences:customized/tailored :innovative technologies:eco-friendliness:easy:hassle-free:professional support:24/7:
- 43 affordability :quality :speed :less typical:eco-friendliness:comfort
- 44 cheap:fast:comfort:good service::
- 45 speed:affordability:security:reliability
- 46 reliability:quickness
- 47 best service:middle cost:worldwide:safety:legal:popular:good feedbacks:
- 48 best:kind personal:cheap:unique:breathtaking
- 49 personal:simple:private:electric:safe:eco-friendly:cheap:private:smart:automation :
- 50 dependability:reliability:loyalty:commitment:safety:consistency:honesty:efficiency:global:eco-friendly :adventurous :comfort :creativity :experience:secure :innovation:stability:teamwork:loyalty:profitability:growth
- 51 speed:affordability:strength:eco-friendly:clean:comfortable:
- 52 acessabilty around world:special offers:

Appx VI Annotators Reviews

Table: Annotators' reviews on annotated value patterns from air transportation start-ups

1.	<ol style="list-style-type: none"> 1. Short phrases connected with theme of startup 2. Name of startup is repeated very often 3. Simple and short sentences 4. A lot of adjectives 5. Agressive advertising
2.	<ol style="list-style-type: none"> 1. Short sentences 2. Variety of a language used for a particular purpose or in a particular social setting, a <u>sociolect</u>, <u>ethnolect</u>, etc. 3. Changes in script, orthography, use of capitals, italicization, small caps, quotes, underlining 4. A lot of adjectives
3.	<ol style="list-style-type: none"> 1. Comparative and Superlative adjectives <p>In order to convince the readers that the product showed is second to none, comparative and superlative adjectives are frequently and commonly used in the start-ups.</p> 2. Compound word <p>Compound words are colloquial in form, which will gives the readers a sense of closeness. Compound words also allow more possibilities to create humorous effect.</p> 3. Simple and imperative sentence <p>Generally speaking, simple sentences are quick and direct in conveying information, while complex sentences will create some suspense dragging the readers' understanding behind.</p> <p>Imperative sentences are often persuasive in that it arises the reads' impulse to buy the product. Imperative sentences, beginning with the verbs, are forceful and tempting, which coincide with the purpose of the start-ups.</p> 4. Innovative title
4.	<p>The most of the sturtups has a lot of identical words, or the same words, such as:</p> <p>Safety, Comfort, Fast, New, Management, Practical, Secure</p>

	<p>I liked sites, where I saw a words: modern, luxury or cheap - , but this sites I have seen in a small amount.</p> <p>In my opinion, having a lot of these words in a different sites creates a boring impression, because at the beginning we are encouraged, but then we see the same things in a lot of times and then we don't want to see identical things anymore. Also, a lot of sites has very short sentences, that do not mean anything important, and do not create an interest from the potential customers.</p>
5.	<p>1) Many expressive adjectives.</p> <p>2) A lot of modern web-pages contains keywords related to the fix of environmental issues, such as emissions and air pollution. (A lot of eco-friendly terms).</p> <p>3) Some of the keywords (such as "fast", " simple") are used so widely, that they are become less attractive and not so noticeable.</p> <p>4) A lot of web-pages are lacking big noticeable header lines with meaningful keywords, that would provide main characteristics of the startup, making it much harder to identify the value of it.</p> <p>5) Startups need to show their values in the simpler language if they want to attract more people (customers)</p> <p>6) Some of the startups have out of date design, which may make them less appealing and more boring to the user</p>
6.	<p>Many expressive adjective</p> <p>Difficult science features not needed because it is difficult for simple peoples</p>
7.	<p>In my experience, most (proper) startup sites can be put into 2 categories:</p> <p>Practical - which mostly describe the startup, it's services and how it all works, using simple words and diagrams.</p> <p>Fluffy - which use many smart words to try to describe how the startup's services are supposed to work (basically fluff), without going much into detail.</p> <p>When it comes to extracting <i>values</i> "Fluffy" sites are obviously preferable it that case. The values (if any are present) are most often highlighted in bold and used as a header for a text block.</p>
8.	<p>The most often used words are:</p> <p>Quality, efficient, secure</p>

	<p>Or maybe some synonym. Most startups will try to bluff to make themselves look better, by stating that their employees are all highly certified and by listing many of its business partnerships most of which are unverifiable.</p>
9.	<p>Qualities are usually either nouns or adjectives; Qualities are usually written as headers to text blocks; Some qualities have aliases/synonyms (i.e. speed == quick).</p> <p>In practice, majority of websites analyzed did not provide any distinguishable qualities, and they are usually mixed together with plain text, if present at all. As such, the probability that this pattern will yield expected qualities is low. To make matters worse, startups were quite scarce in the batch of websites that were analyzed.</p>
10.	<p>Often in headers come across nouns, descriptions consisting of 2-3 words, adjectives are used but half the words or less.</p> <p>Usually they write in a positive way that their product is more convenient, more innovative and more effective but they often write it and it's annoying.</p>
11.	<p>The simplest adjectives, adverbs or combination of words, that describes company from the best side</p> <p>Patterns must be short and logically understandable</p> <p>Pattern must be noticeable</p> <p>Pattern includes safe and reliable</p> <p>Pattern describes professionalism, experience (number one...), high speed and low price.</p>
12.	<p>In order to catch an eye of a potential sponsor or a customer, startup companies use simple but strong value propositions.</p> <p>Such keywords and phrases as easy, free, low-cost, unique, fast and others are catchy and generally really well perceived by people.</p> <p>To make it work even better, startup companies simplify webpages, leaving these keywords in combination with flashy images and bright colors, missing out on complex texts, so that values are maximally visible and understandable.</p>
13.	<p>1) Using bright, colourful epithets</p> <p><i>Example: record-breaking, breath-taking, extraordinary, the best</i></p> <p>2) The positive impact to customer/society (how customer's life will change</p>

	<p>[In most cases simplification of day-to-day routine] in the everyday basis)</p> <p><i>Example: this dishwasher will simplify your day and save your time</i></p> <p><i>Brand type examples: car-manufacturing companies, tech companies</i></p> <p><i>Emotion examples: save time, avoids hassles, reduce efforts</i></p> <p>3) Emotion experience of this particular product/service (how the customer will feel by buying this product/service)</p> <p><i>Example: you will be safe and your property will be safe</i></p> <p><i>Brand type example: banking sector</i></p> <p><i>Emotion examples: reduce risk, reduce anxiety</i></p> <p>4) The customer experience (comfortableness of buying/product receiving process)</p> <p><i>Example: you can easily get your order in the nearest post office</i></p> <p><i>Brand type examples: online stores</i></p> <p><i>Emotion examples: reduces the cost.</i></p>
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Experts' reviews on value taxonomies

1. IT director (MCs, MBA, Master of Aviation Management 2021) of International Airline:

The taxonomies of values look very comprehensive. IATA taxonomy is unfocused, i.e., more focused on related services. I'd say the new study is more innovative. Focused on the main thing. For example, in the IATA taxonomy I did not find anything about the means of transportation, although the main thing in transport is the delivery of a passenger from point A to point B. It would be ideal instantly. The new study features super-sonic or fast.

It can be seen that the industry as a whole is ripe for change. The transition of quality to quantity is coming. For example, autonomous or self-driving vehicles. IATA is more conservative. As for the weak response to COVID, I would explain partly by the methodology. The task involved reacting/reflecting on proposed sites that were created before the pandemic.

2. Commercial Director (PhD) of the regional International Airport:

These taxonomies are extremely useful: for understanding the essence and systematization of services / services, the formation of KPIs in the directions, the distribution of areas of responsibility between the entire links of the value chain. The key difference between the IATA and Values taxonomies is that the IAT taxonomy classifies and systematizes complex hierarchical entities from the point of view of participants in the aviation industry (airport, airlines, etc.), and the Values taxonomy from the position of the passenger / client.

In April 2020, at the height of the pandemic, respondents paid so little attention to health prevention in air travel, as can be seen in the very small Health & Safety category in terms of both the number of values and their weight (numbers about value - the number of people who named this value).

This is due to the fact that in the context of the pandemic, all industry participants (airports, airlines, handling companies, etc.) pay primary attention to the safety of passengers and employees; therefore, all passengers/customers (including respondents) take it for granted (the must) and is no longer perceived as a value (added value).

3. *Commercial Director (MBA in Aviation Management) of International Hub Airport:*

Airlines usually do not offer something more in the field of security than is required by law - it is very expensive to develop and implement extra measures in this area without prior research, so the taxonomy of values opens many opportunities in this direction. Health & Safety is already very strictly regulated by the regulatory authorities. Mast haw. And customers take it for granted and trust the aviation industry in this, so they did not mention it in the survey: if there is a need to disinfect the cabin from a safety point of view, companies will be forced to do it anyway. Services for comfort are not regulated, there can be a wide variety of customer desires. So, they write about their desires. Categories of Comfort and Affordability allow you to see the degree of interest in products.

Value for Money. The price without what you can buy for it is uninformative in the Affordability category. Different expectations from low cost, long haul. For short flights, comfort is of low importance, for intercontinental flights its importance and willingness to pay for it increases. The following studies could be directed to the diversification of values for different types of passengers.

In the future, it would be interesting to know which service for what money people expect, what level of service would be interesting for the bulk and at what price they are ready to buy it: Added Value.

It would be good to fully assess the desires of passengers, since the conditions are unknown: do they want to see a prayer room at the airport or on board the plane?

Very interesting are unexpected findings and formulations of values that were not previously in sight, they could be used. It is also good to use taxonomy in Project Management.

Appx VIII Value count from landing pages annotation

Experiment, Stage 2: value count from start-ups' landing pages annotation

the	262	more	42	industry	22	exceptional	15	cargo	12
and	247	aviation	42	costs	22	trusted	15	planning	12
high	215	unique	41	friendly	21	transportation	15	wifi	12
to	201	affordable	41	make	21	simplicity	15	machine	11
cost	160	new	41	save	21	competitive	15	hours	11
in	154	light	40	cancellation	21	advice	15	vehicles	11
your	141	performance	40	take	21	system	15	software	11
simple	139	personal	40	ergonomic	21	effortless	15	luxury	11
speed	135	effective	39	increase	21	charter	14	do	11
time	129	up	38	efficient	21	better	14	dream	11
service	128	zero	37	it	20	be	14	prices	11
experience	122	innovative	36	human	20	money	14	trips	11
of	118	most	35	next	20	customers	14	quickly	11
travel	112	luggage	35	fleet	20	learning	14	youtube	11
a	110	price	35	manageable	20	white	14	tablet	11
safety	106	operations	35	airline	20	label	14	delivering	11
you	105	automatic	35	bird	20	companies	14	extraordinary	11
low	104	fast	35	excellence	19	any	14	improve	11
safe	97	emission	34	risk	19	international	14	practical	11
flight	97	highest	33	reduce	19	market	14	professional	11
free	96	management	32	smart	19	book	14	lower	11
capacity	94	at	32	self	19	passenger	14	humane	11
security	94	delivery	32	hour	19	easier	14	us	11
best	89	scalable	32	recurring	19	sealed	14	bag	11
autonomous	85	flexible	31	flexibility	19	government	14	highly	11
maintenance	74	design	31	flies	19	updates	14	life	11
we	70	can	31	seamless	18	needs	14	rest	11
smarter	70	mobility	31	online	18	good	14	robot	11
with	70	fly	31	simply	18	flying	14	availability	11
quality	67	no	31	brand	18	quick	14	stress	11
electric	65	privacy	31	intelligence	18	access	13	instant	11
relaxing	65	safely	30	commitment	18	exclusive	13	plane	11
for	64	home	30	one	18	without	13	professionals	11
check	64	all	30	available	18	health	13	accurate	10
bags	63	queue	29	booking	17	provide	13	experiences	10
on	62	business	28	focus	17	0	13	renowned	10
services	62	future	28	simplify	17	kiosks	13	pricing	10
customer	61	s	28	out	17	than	13	need	10
world	57	enjoy	27	by	17	people	13	extensive	10
air	56	global	27	drone	17	space	13	monitoring	10
skip	56	bookings	27	iconic	17	reality	13	dedicated	10
aircraft	56	don	26	making	17	coffee	13	has	10
easy	55	leading	26	manage	17	smart tv	13	integrate	10
solution	55	reducing	26	training	17	netflix	13	special	10
7	55	perfect	26	have	17	reliability	13	repair	10
fully	55	standards	26	offers	17	sustainable	13	pilot	10
private	54	an	26	public	17	anywhere	13	lag	10
comfortable	53	personalized	26	technical	17	offline	12	extra	10
control	53	group	26	profitability	16	track	12	15	10
comfort	51	carry	25	work	16	inspection	12	off	10
technology	49	payments	25	that	16	advanced	12	help	10
real	49	value	24	b2b	16	operational	12	300	10
secure	49	modern	24	years	16	pioneering	12	frontier	10
innovation	48	first	24	beds	16	sustainability	12	1	10
airport	46	jet	24	range	16	over	12	leader	10
efficiency	46	class	24	faster	16	successful	12	tailored	10
reliable	46	is	23	fuel	16	relaxation	12	advantage	10
our	45	or	23	engineering	16	full	12	happy	10
support	45	flights	22	way	16	approach	12	cheap	10
24	45	approved	22	changes	16	tea	12	customize	10
guaranteed	44	analysis	22	day	16	quantitative	12	integrated	10
solutions	44	pick	22	queues	15	saves	12	care	10
t	44	data	22	non	15	airports	12	km	10
from	42	are	22	team	15	monitored	12	change	10

passengers	10	logistics	8	landing	7	h	6	storage	5
infrastructure	10	inspiring	8	pay	7	trip	6	deals	5
computers	10	demand	8	very	7	assistance	6	compact	5
only	9	city	8	put	7	rescue	6	building	5
create	9	built	8	structure	6	clean	6	winning	5
deliver	9	carefully	8	webpage	6	safer	5	born	5
adjustment	9	securely	8	entertainment	6	expand	5	point	5
exposure	9	commercial	8	well	6	5	5	vip	5
effectively	9	everyone	8	intelligent	6	unparalleled	5	complimentary	5
energy	9	go	8	stories	6	stop	5	having	5
proven	9	airspace	8	expertise	6	same	5	transport	5
worry	9	app	8	neuroscience	6	experts	5	types	5
6	9	notifications	8	i	6	custom	5	interesting	5
integration	9	conditions	8	noise	6	love	5	engineer	5
generation	9	as	8	place	6	re	5	add	5
designed	9	history	8	product	6	diverse	5	savings	5
excitement	9	search	8	strong	6	neutral	5	assessment	5
carbon	9	want	8	last	6	analyze	5	equipment	5
reduces	9	4	7	mobile	6	pet	5	strategic	5
decision	9	every	7	seamlessly	6	30	5	never	5
accessible	9	facilities	7	revolutionary	6	hazards	5	distribution	4
convenient	9	not	7	executive	6	adjust	5	records	4
power	9	anytime	7	athletes	6	partnered	5	cycles	4
base	9	digitize	7	indispensable	6	each	5	client	4
interface	9	delivered	7	shopping	6	algorithm	5	working	4
3	9	operating	7	partnerships	6	accommodation	5	transition	4
certified	9	engines	7	points	6	5	5	provides	4
parts	9	less	7	vertical	6	facility	5	committed	4
payment	9	tech	7	slots	6	revolutionizing	5	between	4
use	9	success	7	reduced	6	land	5	artificial	4
taxi	9	now	7	charge	6	relax	5	greenhouse	4
intuitive	9	news	7	get	6	duty	5	been	4
lounge	9	traffic	7	ease	6	compliance	5	tickets	4
latest	9	benefits	7	baggage	6	eco	5	agent	4
company	9	level	7	cloud	6	reputation	5	surveillance	4
car	9	cutting	7	elite	6	established	5	optimise	4
compensation	9	multiple	7	great	6	plans	5	tours	4
pickup	9	how	7	doesn	6	small	5	acquisition	4
collect	9	automated	7	drop	6	actions	5	delays	4
destination	9	platform	7	network	6	what	5	freight	4
pre	9	shipping	7	turnaround	6	aog	5	empty	4
revolutionize	9	communicate	7	skilled	6	family	5	detect	4
sales	8	end	7	installation	6	integrity	5	technologies	4
leasing	8	emissions	7	sensor	6	they	5	circadian	4
additional	8	impact	7	communication	6	stable	5	transparent	4
research	8	automate	7	view	6	active	5	above	4
edge	8	corporate	7	analytics	6	opportunities	5	manufacturing	4
environmentally	8	drive	7	about	6	leaders	5	area	4
powerful	8	revenue	7	internet	6	zones	5	different	4
based	8	into	7	understand	6	drones	5	discounts	4
worldwide	8	long	7	across	6	major	5	lightweight	4
refreshing	8	damage	7	saving	6	growing	5	leadership	4
customizable	8	other	7	standard	6	rate	5	aerospace	4
times	8	before	7	contact	6	let	5	discovery	4
experienced	8	sleeping	7	multi	6	journey	5	friction	4
systems	8	anyone	7	collection	6	learn	5	communities	4
contaminants	8	asset	7	package	6	award	5	rich	4
mission	8	door	7	enhance	6	predictive	5	remotely	4
efficiently	8	location	7	weight	6	existing	5	36	4
capabilities	8	process	7	plan	6	practicality	5	away	4
premium	8	included	7	made	6	longer	5	scientists	4
top	8	partner	7	aerial	6	quiet	5	just	4
convenience	8	resources	7	bob	6	cheaper	5	expectations	4
lowest	8	comprehensive	7	traveler	6	competitive	5	crew	4
will	8								

ambulance	4	propulsion	4	interactive	3	component	3	features	3
choice	4	array	4	simplifying	3	scale	3	charters	3
highway	4	optimize	4	travelers	3	focuses	3	recharge	3
around	4	positive	4	cure	3	tailor	3	meet	3
arrive	4	closer	4	year	3	freedom	3	fastest	3
clear	4	including	4	enable	3	ramp	3	offsetting	3
quote	4	missions	4	optimized	3	customized	3	burn	3
gather	4	front	4	lives	3	see	3	capability	3
far	4	identify	4	consistent	3	insight	3	overweight	3
largest	4	requirements	4	movement	3	action	3	bridging	3
automation	4	expert	4	logbook	3	organized	3	route	3
local	4	growth	4	pollution	3	should	3	provider	3
potential	4	status	4	hidden	3	policy	3	know	3
give	4	earlier	4	destinations	3	trustportation	3	employees	3
helps	4	sleep	4	airplane	3	industries	3	compelling	3
lane	4	environmental	4	dynamic	3	shower	3	agile	3
information	4	profitable	4	conveniently	3	grade	3	respect	3
2	4	environment	4	marketplace	3	hybrid	3	faa	3
them	4	qualified	3	focused	3	reach	3	overhaul	3
passion	4	right	3	many	3	manufactured	3	recovery	3
field	4	maneuverability	3	test	3	actionable	3	overall	3
reduction	4		3	digital	3	social	3	seats	3
mind	4	finest	3	gravity	3	areas	3	unlimited	3
schedules	4	served	3	response	3	responsibility	3	agencies	3
their	4	always	3	where	3	development	3	25	3
increases	4	size	3	problem	3	few	3	head	3
urban	4	decisions	3	insights	3	fares	3	variety	3
traveling	4	progressive	3	robotic	3	million	3	own	3
sky	4	connected	3	fitness	3	novel	3	elevate	3
through	4	delicious	3	immediate	3	onboard	3	inventory	3
tracking	4	hotel	3	cruising	3	amazing	3	ai	3
much	4	investment	3	gas	3	mean	3	uniquely	3
direct	4	widest	3	suits	3	chat	3	share	3
capital	4	operators	3	follow	3	select	3	rank	3
slot	4	luxuriously	3	ready	3	does	3	benign	3
exciting	4	100mph	3	big	3	operation	3	detection	3
units	4	activity	3	directly	3	early	3	lilium	3
components	4	increasing	3	complete	3	morning	3	contracted	3
focusing	4	fresh	3	like	3	short	3	engine	3
concept	4	nutritious	3	avoid	3	important	3	removal	3
applications	4	parking	3	lot	3	easily	3	rapid	3
specific	4	doing	3	nature	3	mile	3	prognostics	3
scientific	4	repairs	3	designs	3	some	3	distances	3
tactical	4	stay	3	who	3	projects	3	legroom	3
resourceful	4	connections	3	satisfy	3	remote	3	redefining	3
asdf	4	craftsmen	3	makes	3	minimal	3	specialist	3
refund	4	artisans	3	broad	3	single	3	ensure	3
case	4	enjoyment	3	everything	3	large	3	locations	3
ticket	4	inspections	3	agility	3	carrier	3	coverage	3
trained	4	possibilities	3	days	3	co2	3	attention	3
interior	4	latter	3	click	3	further	3	set	3
production	4	transaction	3	awards	3	possible	3	goods	3
discount	4	also	3	communications	3	dedication	3	keps	3
unmatched	4	develop	3		3	if	3	offer	3
nothing	4	green	3	providing	3	improved	3	knowledge	3
accepted	4	guarantee	3	affordability	3	lighthouse	3	biggest	3
transactions	4	transparency	3	disruptive	3	flightseeing	3	hassle	3
piloted	4	lasting	3	planet	3	brands	3	diligence	2
preferences	4	partners	3	find	3	consultancy	3	forward	2
total	4	this	3	airlines	3	filter	3	teamwork	2
optimisation	4	responsible	3	anything	3	instantly	3	conventional	2
clients	4	explore	3	install	3	airworthiness	3	predictability	2
versatile	4	totally	3	schedule	3	specialized	3	durable	2
wide	4	centre	3	vacation	3	fun	3	runway	2

driven 2	wasting2	globally 2	piece 2	those 2
itinerary 2	option 2	certificates 2	flows 2	enhancing 2
productivity 2	exchange 2	legs 2	card 2	main 2
200 2	listen 2	economical 2	credit 2	streamlined 2
amenities 2	refurbishments 2	purchase 2	e 2	activities 2
relaxed 2	collaborate 2	would 2	address 2	community 2
thinking 2	combine 2	unknown 2	providers 2	taking 2
businesses 2	ventilation 2	today 2	canceled 2	unsurpassed 2
managing 2	form 2	able 2	delayed2	source 2
useful 2	modelling 2	workflows 2	lost 2	hub 2
leg 2	ahead 2	cabin 2	count 2	he 2
costly 2	heads 2	precision 2	courier 2	deserve2
api 2	competition 2	seal 2	confidence 2	winglets 2
simulation 2	liability2	increased 2	enjoyable 2	browse 2
3d 2	aircrafts 2	sure 2	advisory 2	appropriate 2
humility 2	connection 2	agriculture 2	globe 2	read 2
treatment 2	natively 2	started 2	serving 2	proficient 2
rental 2	authorizations 2	website2	adaptive 2	maximize 2
urgent 2	cleaner 2	serene 2	composite 2	fi 2
beautiful 2	avionics 2	trasporto 2	decrease 2	wi 2
type 2	spare 2	link 2	reviews2	changing 2
remove 2	specialty 2	which 2	awareness 2	aeronautical 2
unforgettable 2	robust 2	hourly 2	footprint 2	guided 2
ground 2	creating 2	fits 2	greater 2	conditioning 2
press 2	date 2	web 2	arrangements 2	germany 2
influence 2	suite 2	supplier 2	done 2	upgrades 2
infinita 2	upholstery 2	audits 2	ll 2	outliers 2
deployment 2	outstanding 2	users 2	confident 2	maximum 2
groundbreaking 2	events 2	digitalization 2	connecting 2	deep 2
advancements 2	developed 2	document 2	organizations 2	accolades 2
selling 2	generic 2	become2	organization 2	unnecessary 2
still 2	chronotype 2	beyond 2	greener 2	tested 2
combined 2	virtual 2	shipments 2	smooth 2	earth 2
birds 2	survival 2	innovate 2	transformation 2	promotion 2
my 2	prepare 2	eye 2	brokers2	term 2
champion 2	promise 2	intervention 2	daily 2	fuels 2
regional 2	airborne 2	helicopter 2	touch 2	adoption 2
me 2	strikes 2	various 2	soar 2	cases 2
person 2	master 2	customs 2	salt 2	inclusive 2
institutions 2	populations 2	childpassenger 2	sea 2	accelerated 2
cancel 2	robird 2	eastern 2	record 2	trust 2
exceeds 2	falcon 2	tmt 2	dust 2	startup 2
general 2	414k 2	productive 2	en 2	exists 2
accessibility 2	turn 2	fleets 2	memorable 2	stream 2
developments 2	87k 2	seat 2	reinvent 2	ability 2
dates 2	800 2	opportunity 2	national 2	office 2
may 2	tools 2	newly 2	talented 2	watches 2
breathhtaking 2	heavy 2	essential 2	tool 2	education 2
taps 2	everywhere 2	0 2	allowed 2	turnarounds 2
high 2	acquisitions 2	fees 2	direction 2	vtol 2
leather 2	connectivity 2	technicians 2	account2	membership 2
ur 2	individual 2	minimises 2	timely 2	elevated 2
weather 2	madrid 2	advisors 2	gentle 2	observation 2
forecast 2	barcelona 2	was 2	boost 2	connect2
model 2	vision 2	updated 2	messaging 2	patented 2
added 2	understanding 2	sentient2	apply 2	superior 2
break 2	economy 2	join 2	minute 2	program 2
science 2	until 2	hyperloop 2	surprises 2	protection 2
talk 2	rates 2	evolution 2	simplified 2	peace 2
port 2	discreet2	challenging 2	adjusts 2	urbanized 2
injury 2	ratios 2	20 2	revenues 2	acting 2
TRUE 2	when 2	return 2	alerts 2	cities 2
satisfaction 2	networks 2	solving 2	thing 2	win 2
lowers 2	review 2	america 2	rights 2	google 2

tv	2	universally	1	none	1	reflects	1	straight	1
evolving	2	corporations	1	flow	1	ice	1	built	1
corrective	2	passenger	1	accounts	1	chief	1	perception	1
come	2	gateway	1	8	1	efficiencies	1	colors	1
justice	2	sofas	1	intensive	1	saas	1	preferred	1
empowerment	2	africa	1	covered	1	invests	1	tagging	1
near	2	uncompromisingly	1	drift	1	relationships	1	aerinx	1
radius	2	1		comforte	1	welcome	1	among	1
email	2	stuff	1	ultra	1	trenches	1	beaten	1
relatively	2	effortless	1	defense	1	23	1	path	1
atmosphere	2	humanitarian	1	increasingly	1	saved	1	hi	1
ranking	2	principally	1	stability	1	related	1	scheduling	1
thousands	2	thinner	1	scheduled	1	involved	1	suitable	1
reservations	2	playing	1	financial	1	utilizes	1	heirloom	1
options	2	lighter	1	second	1	camo	1	advantages	1
excellent	2	sealing	1	routine	1	stc	1	certifications	1
practices	2	tape	1	island	1	techlog	1	think	1
transit	2	replacement	1	structured	1	automatically	1	lining	1
things	2	loads	1	critical	1	fbo	1	counters	1
heart	2	surface	1	talanted	1	donate	1	error	1
concierge	2	rugged	1	unstructured	1	corrosive	1	efforts	1
computer	2	engaged	1	pilotless	1	safest	1	warmth	1
ultralight	2	paying	1	signature	1	sign	1	valued	1
answers	2	preparations	1	lossless	1	parabolic	1	redesigned	1
age	2	outmost	1	compressed	1	experiments	1	devoted	1
priority	2	excited	1	creative	1	licensed	1	700	1
recycling	2	lingual	1	independent	1	smallest	1	16	1
protecting	2	modality	1	airframe	1	jetpack	1	finance	1
patent	2	economics	1	caused	1	trek	1	costing	1
pending	2	maintain	1	wins	1	substantial	1	manages	1
student	2	unwavering	1	police	1	protected	1	decades	1
matter	2	professionalis	1	mluxurious	1	going	1	bank	1
natural	2	1		inter	1	scenic	1	bonus	1
utilization	2	350	1	overhuals	1	imaging	1	fare	1
fee	2	tubular	1	per	1	digitized	1	humaine	1
keep	2	eliminates	1	landside	1	autonomy	1	annual	1
competetive	2	anxiety	1	adaptable	1	nice	1	complex	1
quotes	2	brief	1	programmes	1	aiming	1	terminal	1
encourage	2	conference	1	continents	1	executing	1	supremely	1
effectiveness	2	procure	1	dependable	1	volcanic	1	completely	1
why	1	survey	1	thrill	1	ash	1	two	1
exemplary	1	forestry	1	interiors	1	processes	1	circle	1
infrastructures	1	products	1	dependability	1	aggregating	1	dealers	1
stock	1	spares	1	finances	1	recognition	1	eal	1
allowing	1	reward	1	conservation	1	revolutionise	1	site	1
compromising	1	levitation	1	downtime	1	serve	1	authorized	1
prove	1	tailorable	1	entrepreneural	1	globality	1	persistent	1
maintains	1	wealth	1	saying	1	ideas	1	call	1
absolute	1	significant	1	specified	1	everyday	1	gallery	1
bespoke	1	tremendous	1	round	1	dashboards	1	ensures	1
hdtv	1	concrete	1	dont	1	tap	1	continues	1
individuals	1	room	1	official	1	flown	1	target	1
breakthrough	1	disaster	1	cheapest	1	miles	1	excess	1
operate	1	earn	1	prestige	1	gmv	1	protect	1
respected	1	relief	1	taxes	1	basket	1	stress	1
desk	1	handling	1	imposed	1	ads	1	evolutionize	1
servizio	1	adapt	1	surcharges	1	32k	1	uncover	1
emergenze	1	mining	1	subject	1	post	1	differently	1
novelty	1	execution	1	notice	1	supports	1	travelling	1
comfortability	1	assist	1	purchased	1	emails	1	refined	1
school	1	handy	1	limited	1	processing	1	elegant	1
materiale	1	adhesion	1	aware	1	rooming	1	frequency	1
firm	1	manufacturers	1	precise	1	within	1	interconnected	1
outstandingly	1	center	1	restrictions	1	responsive	1	identification	1

timed	1	media	1	investments	1	spans	1	wave	1
farther	1	ultimate	1	ingo	1	collaborating	1	comfortably	1
ever	1	retina	1	economic	1	spanish	1	revolutionized	1
stronger	1	weeks	1	request	1	niche	1	lift	1
consolidated	1	positioning	1	safety	1	practice	1	italian	1
evaluation	1	surveillance	1	reimagining	1	extracting	1	sound	1
situational	1	stakeholders	1	ndustry	1	scan	1	hosted	1
look	1	rating	1	payload	1	cctv	1	its	1
rising	1	build	1	perspectives	1	locked	1	pipeline	1
galaxy	1	gives	1	advancing	1	xray	1	talent	1
disciplined	1	commerce	1	delivers	1	viewed	1	folding	1
accidents	1	standarts	1	departments	1	weigh	1	b2e	1
preventing	1	pizza	1	everybody	1	arrival	1	300km	1
dramatically	1	broker	1	droneterminus	1	even	1	allowance	1
down	1	organised	1	favourite	1	enhanced	1	bed	1
property	1	gold	1	innvovative	1	memories	1	negotiate	1
list	1	discover	1	flocks	1	budget	1	lifestyles	1
spirals	1	leap	1	provided	1	worlds	1	experiencing	1
enemy	1	varied	1	strategy	1	body	1	pleasant	1
autopilot	1	quaranteed	1	marketing	1	cleaning	1	happiness	1
u	1	improving	1	simulators	1	airside	1	cable	1
mimics	1	fiction	1	ffa	1	powered	1	negotiated	1
since	1	wh	1	accommodate	1	teams	1	entertainment	1
already	1	works	1	placed	1	oiled	1	inflight	1
there	1	strength	1	fantastic	1	developer	1	meals	1
being	1	comercial	1	leisure	1	vs	1	coronavirus	1
prevent	1	awos	1	ethics	1	fossil	1	phone	1
anti	1	atc	1	openness	1	thoughtfully	1	screening	1
uptime	1	atis	1	swiftair	1	techniques	1	chemical	1
truth	1	rated	1	unmanned	1	netwoek	1	airplanes	1
entrepreneurial	1	accuracy	1	domestic	1	pragmatic	1	sale	1
indemnification	1	lure	1	swift	1	restaurant	1	central	1
choosing	1	skytran	1	clothing	1	positively	1	14	1
hotels	1	racing	1	auto	1	programme	1	uk	1
suited	1	bring	1	unconventional	1	loyalty	1	personnel	1
upwards	1	constructed	1	used	1	openly	1	park	1
100	1	argus	1	scotland	1	turning	1	vinyl	1
sports	1	tying	1	channell	1	haul	1	south	1
vehicle	1	lycoming	1	materials	1	looking	1	china	1
clicks	1	state	1	rentals	1	greasy	1	informative	1
assemblies	1	continental	1	destiny	1	tiring	1	europe	1
volume	1	stabilized	1	commitments	1	maths	1	canada	1
commands	1	art	1	planes	1	tsa	1	usa	1
corrosion	1	recreational	1	ski	1	getaway	1	fabric	1
cluster	1	standardized	1	star	1	spring	1	markets	1
pad	1	shipment	1	functionality	1	ambition	1	servicing	1
wider	1	nonstop	1	gift	1	inspire	1	roviding	1
creativity	1	herd	1	ops	1	engage	1	adventure	1
modal	1	uncompromising	1	promos	1	compliant	1	step	1
deliveries	1		1	workload	1	handle	1	discretion	1
responsiveness	1	refunds	1	uncomplicated	1	bonded	1	invest	1
technological	1	centralised	1	interested	1	hire	1	results	1
continuous	1	functions	1	pollutant	1	biometric	1	competence	1
capable	1	accretive	1	roi	1	breed	1	improvement	1
automating	1	operationally	1	augment	1	malta	1	transform	1
sampling	1	complementary	1	hardware	1	together	1	enhances	1
stack	1	heating	1	coast	1	exotic	1	uav	1
measurements	1	insulation	1	determined	1	reason	1	integrating	1
lowcost	1	aitplane	1	japanese	1	operator	1	luxuries	1
admirable	1	climate	1	collective	1	achieve	1	faceted	1
nearest	1	riding	1	millions	1	suit	1	bypass	1
issue	1	user	1	release	1	worktable	1	presence	1
progress	1	taxis	1	key	1	speaker	1	highways	1
compensations	1	borrow	1	players	1	emits	1	greatest	1

carpeting	1	sold	1	ar	1	contract	1	ve	1
tanks	1	maintained	1	innovating	1	refrigerants	1	once	1
explanation	1	thorough	1	billion	1	ozone	1	driver	1
proves	1	patient	1	job	1	tourists	1	specifications	1
interlining	1	calm	1	ecosystem	1	drives	1	modify	1
enter	1	instructors	1	aggregation	1	accessability	1	image	1
expeptional	1	feel	1	specials	1	received	1	strive	1
match	1	controlled	1	staying	1	views	1	cookies	1
housands	1	genuine	1	levels	1	current	1	listed	1
species	1	task	1	holistic	1	places	1	pieces	1
peregrine	1	deployed	1	pressure	1	logo	1	chase	1
empowers	1	minimalism	1	wherever	1	regulatory	1	emergency	1
cabinet	1	unrivalled	1	whenever	1	doorstep	1	advance	1
builder	1	winglet	1	part	1	easiest	1	cards	1
emotely	1	minimum	1	proof	1	engineered	1	booked	1
dji	1	engagement	1	relevant	1	preserving	1	rather	1
advisories	1	content	1	homogeneously	1	hawaiian	1	suitcase	1
turbulence	1	timeshifter	1	1	1	composites	1	reliably	1
safeconnect	1	carson	1	hazardous	1	freshness	1	position	1
42	1	activate	1	kind	1	ranked	1	passionate	1
wood	1	estate	1	continually	1	pleasure	1	truly	1
complement	1	diploma	1	database	1	mechanism	1	start	1
selections	1	detail	1	honest	1	wildlife	1	emerging	1
division	1	smiling	1	affiliation	1	metrology	1	accelerates	1
refurbishing	1	aero	1	combining	1	fundraising	1	reachable	1
attractive	1	shell	1	feedback	1	funds	1	io	1
plush	1	offset	1	careers	1	beauty	1	accomplishment	1
vast	1	subscription	1	reporting	1	cheapness	1	1	1
exhibitors	1	difficult	1	supportive	1	spend	1	ensuring	1
inspector	1	ratio	1	incident	1	algorithms	1	soloutions	1
attendees	1	construction	1	avoidance	1	eror	1	balance	1
500	1	employee	1	collision	1	arrange	1	reserved	1
visited	1	owners	1	procedures	1	royalty	1	2020	1
exhibition	1	disruption	1	pattern	1	premier	1	prime	1
executives	1	modernize	1	agree	1	inconvenient	1	platinum	1
profile	1	role	1	valuable	1	toolkit	1	iberia	1
career	1	weird	1	burns	1	basis	1	another	1
grow	1	shape	1	locker	1	spectrum	1	show	1
insured	1	hundreds	1	rooms	1	continued	1	video	1
requirement	1	old	1	bathroom	1	recognized	1	seconds	1
symptoms	1	secured	1	cabins	1	chauffeur	1	45	1
airlander	1	flier	1	resting	1	control24	1	speedy	1
extensively	1	frequent	1	men	1	kinds	1	blockchain	1
pilots	1	consumer	1	women	1	delay	1	logos	1
limits	1	operated	1	open	1	registred	1	three	1
refuse	1	siomplicity	1	voice	1	trailer	1	belt	1
sell	1	putting	1	whole	1	reports	1	reclaim	1
expenses	1	timeslot	1	helping	1	attend	1	waiting	1
revolutionar	1	promote	1	fortunate	1	later	1	suitcasecheck	1
elegance	1	inform	1	capture	1	documentation	1	moment	1
modernization	1	condition	1	greenest	1	quotations	1	prediction	1
credibility	1	combines	1	thousand	1	containers	1	while	1
amendments	1	eliminate	1	takes	1	trucking	1	forget	1
extremely	1	usefull	1	shorter	1	insurance	1	paul	1
alleviate	1	choose	1	influential	1	exporter	1	tong	1
allows	1	repertory	1	bus	1	importer	1	bike	1
minimizing	1	visibility	1	fte	1	exceed	1	recommend	1
teacher	1	box	1	regarded	1	style	1	steve	1
domain	1	uncrowded	1	2006	1	regulations	1	kimbler	1
download	1	balanced	1	innovators	1	electronic	1	needed	1
must	1	spread	1	connects	1	english	1	picked	1
mitigation	1	wear	1	coach	1	español	1	planned	1
exact	1	innovations	1	transfers	1	woman	1	dropped	1
relocation	1	wasted	1	page	1	meets	1	somewhere	1

faq	1	recebe	1	rewards	1	unconnected	1	capturing	1
question	1	você	1	footer	1	choise	1	enabling	1
ones	1	so	1	lessees	1	entrance	1	introducing	1
example	1	invoicing	1	exceeding	1	civilian	1	unplanned	1
military	1	setup	1	leases	1	rural	1	objectives	1
frienliness	1	retrofit	1	during	1	horizons	1	launch	1
developing	1	Pods	1	courses	1	application	1	prototyping	1
goodbye	1	conversion	1	menu	1	implement	1	study	1
tqi	1	fasdf	1	painting	1	programs	1	feasibility	1
paypal	1	union	1	commercialization	1	uia	1	rpas	1
stringent	1	twin	1		1	order	1	integral	1
24h	1	sharing	1	workshop	1	meaningful	1	roommate	1
1992	1	privileges	1	line	1	correction	1	payback	1
bureaucracy	1	pioneer	1	depth	1	minimize	1	renovating	1
board	1	transportion	1	optimal	1	continuing	1	coolers	1
actual	1	breaking	1	attentiveness	1	rapidly	1	fit	1
timeliness	1	barriers	1	successfully	1	monitor	1	shuttle	1
concerns	1	entry	1	interaction	1	distraction	1	seaplane	1
quota	1	attentive	1	values	1	claims	1	cashflow	1
culture	1	react	1	standing	1	report	1	cash	1
hangar	1	helpful	1	soon	1	cam	1	back	1
turbine	1	angle	1	asd	1	arc	1	upsells	1
consolidation	1	timeshifts	1	era	1	profit	1	menos	1
scheme	1	fair	1	365	1	unlocks	1	eficiência	1
magnetic	1	questions	1	turboprops	1	groupdesk	1	controle	1
applied	1	accelerate	1	normal	1	visions	1	em	1
labor	1	investors	1	rix	1	atmospheric	1	qualquer	1
checks	1	forefront	1	interwined	1	requests	1	lugar	1
proprietary	1	move	1	matters	1	advantega	1	unbiased	1
indenização	1	minimizes	1	something	1	lead	1		

Appx IX SmartLynx Letter

Letter from SmartLynx Airlines: Air Transport Value Taxonomy implementation in the business process of online check-in and shopping platform

Date: 14/07/2022

Review on Air Transport Value Taxonomy

In 2020, SmartLynx Airlines launched a project of developing a new online check-in system combined with shopping options.

In the process of creating an online system, the Air Transport Value Taxonomy developed by Olga Zervina from Transport and Telecommunication Institute was successfully implemented. The taxonomy as a categorization of expected customer values enabled the development team to establish the range and degree of significance of the products that were to be included in the options for our company's online store.

The usage of taxonomy improved the productivity of the development team and resulted in a dramatic reduction of time and efforts taken in producing an effectively functioning check-in and shopping platform.



Aleksejs Gondaļins
IT Director

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67207392 | www.smartlynx.aero

Appx X Odessa Airport Letter

Letter of Expert Review from the Commercial Director of Odessa International Airport



товариство з обмеженою відповідальністю
МІЖНАРОДНИЙ АЕРОПОРТ «ОДЕСА»
65036, Україна, м. Одеса
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info@odessa.aero

limited liability company
ODESA INTERNATIONAL AIRPORT
65036, Ukraine, Odessa
Central airport, 2
tel/fax: (048) 761-69-00
info@odessa.aero

№ 4297/801 № 18.03.2021 To whom it may concern

**EXPERT OPINION
ABOUT TAXONOMY AND VALUE PROPOSITION DEVELOPED BY
OLGA ZERVINA**

Value proposition based on taxonomy approach developed by the author has a practical significance and is relevant for implementation and utilization by enterprises of the aviation industry, e.g. airlines, airports, ground handling companies, providers of air navigation services etc. The proposition has a complex of relevant inputs of aviation industry and a set of intellectual and clear outputs in charge of value chain proposition.

I would definitely recommend value proposition developed by the author for practical use to aviation managers.

Kind regards
Commercial Director



Vyacheslav Cheglatonyev, PhD

Поштова адреса для листування: вул. Центральний аеропорт, 2, м. Одеса, 65036, Україна
Address for lettering: 2 Central airport str., Odessa, 65036, Ukraine

Appx XII spaCy Configuration

spaCy Configuration

Used default values:

```
[paths]
train = "./spacy/train.spacy"
dev = "./spacy/valid.spacy"
vectors = null
init_tok2vec = null

[system]
gpu_allocator = null
seed = 0

[nlp]
lang = "en"
pipeline = ["tok2vec","ner"]
batch_size = 1000
disabled = []
before_creation = null
after_creation = null
after_pipeline_creation = null
tokenizer = {"@tokenizers":"spacy.Tokenizer.v1"}

[components]

[components.ner]
factory = "ner"
incorrect_spans_key = null
moves = null
scorer = {"@scorers":"spacy.ner_scorer.v1"}
update_with_oracle_cut_size = 100

[components.ner.model]
@architectures = "spacy.TransitionBasedParser.v2"
state_type = "ner"
extra_state_tokens = false
hidden_width = 64
maxout_pieces = 2
use_upper = true
nO = null

[components.ner.model.tok2vec]
@architectures = "spacy.Tok2VecListener.v1"
width = ${components.tok2vec.model.encode.width}
upstream = "*"

[components.tok2vec]
factory = "tok2vec"

[components.tok2vec.model]
@architectures = "spacy.Tok2Vec.v2"

[components.tok2vec.model.embed]
@architectures = "spacy.MultiHashEmbed.v2"
width = ${components.tok2vec.model.encode.width}
attrs = ["NORM","PREFIX","SUFFIX","SHAPE"]
rows = [5000,2500,2500,2500]
include_static_vectors = false
```

```
[components.tok2vec.model.encode]
@architectures = "spacy.MaxoutWindowEncoder.v2"
width = 96
depth = 4
window_size = 1
maxout_pieces = 3
```

```
[corpora]
```

```
[corpora.dev]
@readers = "spacy.Corpus.v1"
path = ${paths.dev}
max_length = 0
gold_preproc = false
limit = 0
augmenter = null
```

```
[corpora.train]
@readers = "spacy.Corpus.v1"
path = ${paths.train}
max_length = 0
gold_preproc = false
limit = 0
augmenter = null
```

```
[training]
dev_corpus = "corpora.dev"
train_corpus = "corpora.train"
seed = ${system.seed}
gpu_allocator = ${system.gpu_allocator}
dropout = 0.1
accumulate_gradient = 1
patience = 1600
max_epochs = 0
max_steps = 100
eval_frequency = 10
frozen_components = []
annotating_components = []
before_to_disk = null
```

```
[training.batcher]
@batchers = "spacy.batch_by_words.v1"
discard_oversize = false
tolerance = 0.2
get_length = null
```

```
[training.batcher.size]
@schedules = "compounding.v1"
start = 100
stop = 1000
compound = 1.001
t = 0.0
```

```
[training.logger]
@loggers = "spacy.ConsoleLogger.v1"
progress_bar = false
```

```
[training.optimizer]
```

```
@optimizers = "Adam.v1"
beta1 = 0.9
beta2 = 0.999
L2_is_weight_decay = true
L2 = 0.01
grad_clip = 1.0
use_averages = false
eps = 0.00000001
learn_rate = 0.001

[training.score_weights]
ents_f = 1.0
ents_p = 0.0
ents_r = 0.0
ents_per_type = null

[pretraining]

[initialize]
vectors = ${paths.vectors}
init_tok2vec = ${paths.init_tok2vec}
vocab_data = null
lookups = null
before_init = null
after_init = null

[initialize.components]

[initialize.tokenizer]
```

Screenshots

Values_tsi_TEST.jsonl


```

JSON formatter
JSON BEAUTIFIER  JSON PARSER  XML FORMATTER  JSBEAUTIFIER
22 [{"annotations": [{"text_extraction": {"text_segment": {"end_offset": 13, "start_offset": 0}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 21, "start_offset": 14}}, "display_name":
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  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 36, "start_offset": 34}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 43, "start_offset": 37}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 63, "start_offset": 48}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 75, "start_offset": 72}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 80, "start_offset": 77}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 85, "start_offset": 81}}, "display_name":
  "not_value"}], "text_snippet": {"content": "International Trading Corporation in Turkey \u0200c\u0d83d\u0dce7
info@ecohos.com \u0260e\u0fe0f +90 (212) 546 6969"}}]
23 [{"annotations": [{"text_extraction": {"text_segment": {"end_offset": 8, "start_offset": 0}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 16, "start_offset": 9}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 23, "start_offset": 17}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 26, "start_offset": 24}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 30, "start_offset": 27}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 39, "start_offset": 31}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 43, "start_offset": 41}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 50, "start_offset": 44}}, "display_name":
  "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 59, "start_offset": 51}}, "display_name":
  "value"}, {"text_extraction": {"text_segment": {"end_offset": 67, "start_offset": 60}}, "display_name":
  "not_value"}], "text_extraction": {"text_segment": {"end_offset": 73, "start_offset": 68}}, "display_name":
  "not_value"}]
Ln: 1 Col: 1

```

Metrics.json

```

{
  "token_acc":1.0,
  "token_p":1.0,
  "token_r":1.0,
  "token_f":1.0,
  "ents_p":0.8483563097,
  "ents_r":0.8908685969,
  "ents_f":0.8690928843,
  "ents_per_type":{
    "not_value":{
      "p":0.8487752929,
      "r":0.9779141104,
      "f":0.9087799316
    },
    "value":{
      "p":0.75,
      "r":0.0361445783,
      "f":0.0689655172
    }
  }
}

```

```
},  
  "speed":19350.4910836589  
}
```

There are also more details about the training process:

Dropout probability = 0.1

Accumulate gradient = 1 (enables early stopping for the model)

max_epochs = 0 (unlimited epochs amount)

Adam optimizer was also used with default recommended parameters:

```
beta1 = 0.9  
beta2 = 0.999  
epsilon = 1e-08  
L2_regularization = 0.01  
Learning rate = 0.01  
Learning_rate_decay = 0.01  
Gradient clipping = 1 (enabled)
```



```

JSON formatter
JSON BEAUTIFIER  JSON PARSER  XML FORMATTER  JSBEAUTIFIER
22 {"annotations": [{"text_extraction": {"text_segment": {"end_offset": 3, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 11, "start_offset": 4}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 14, "start_offset": 12}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 24, "start_offset": 15}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 8, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 32, "start_offset": 27}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 37, "start_offset": 33}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 44, "start_offset": 38}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 56, "start_offset": 45}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 8, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 103, "start_offset": 74}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 0, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 131, "start_offset": 108}}, "display_name":
    "not_value"}], "text_snippet": {"content": "Travel Smarter. Spend Points, Not Money."}}
23 {"annotations": [{"text_extraction": {"text_segment": {"end_offset": 4, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 12, "start_offset": 5}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 19, "start_offset": 13}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 33, "start_offset": 20}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 43, "start_offset": 34}}, "display_name":
    "not_value"}], "text_snippet": {"content": "The Airline Of Indonesia | 24hrs Call Center 08041807807,
    +622123519999 | customer@garuda-indonesia.com | FB https://t.co/mq0603cDj1"}}
Ln: 1 Col: 1

```

Values_tsi_VALIDATION.jsonl

```

JSON formatter
JSON BEAUTIFIER  JSON PARSER  XML FORMATTER  JSBEAUTIFIER
22 {"annotations": [{"text_extraction": {"text_segment": {"end_offset": 13, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 21, "start_offset": 14}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 33, "start_offset": 22}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 36, "start_offset": 34}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 43, "start_offset": 37}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 63, "start_offset": 48}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 75, "start_offset": 72}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 80, "start_offset": 77}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 85, "start_offset": 81}}, "display_name":
    "not_value"}], "text_snippet": {"content": "International Trading Corporation in Turkey \u209c\u209c\u209c\u209c
    info@ecohos.com \u260e\u260e +90 (212) 546 6969"}}
23 {"annotations": [{"text_extraction": {"text_segment": {"end_offset": 8, "start_offset": 0}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 16, "start_offset": 9}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 23, "start_offset": 17}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 26, "start_offset": 24}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 30, "start_offset": 27}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 39, "start_offset": 31}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 43, "start_offset": 41}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 50, "start_offset": 44}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 59, "start_offset": 51}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 67, "start_offset": 60}}, "display_name":
    "not_value"}, {"text_extraction": {"text_segment": {"end_offset": 73, "start_offset": 68}}, "display_name":
    "not_value"}], "text_snippet": {"content": "International Trading Corporation in Turkey \u209c\u209c\u209c\u209c
    info@ecohos.com \u260e\u260e +90 (212) 546 6969"}}
Ln: 1 Col: 1

```

Appx XIV Twitter Annotation Data

Twitter annotation raw data

Link for Twitter annotation raw data:

https://colab.research.google.com/drive/1tdL43hbDUnsrX3w4LgXgPNaPsGDDhA3s#scrollITo=_fxWP-cc0EUA

Sample

```
"Id": "6cac15aa-04d1-4951-83fb-87b2221201a4",
  "Contents": null,
  "StartOffset": 0,
  "EndOffset": 0,
  "Details": null,
  "ItemId": "02e3ca22-bd17-4c15-b587-46e21029c6d0",
  "JobId": "224f892a-85cb-4b51-b41e-50b1e143b042",
  "JobTask": null,
  "User": null,
  "Timestamp": "2021-02-22T10:57:43.207",
  "Type": "no-selection",
  "_SelectionDetailsTypes": []
},
{
  "Id": "ebf18953-e88a-483e-8cc9-acdc9f82b50c",
  "Contents": "leading",
  "StartOffset": 14,
  "EndOffset": 21,
  "Details": "attribute",
  "ItemId": "02e3ca22-bd17-4c15-b587-46e21029c6d0",
  "JobId": "224f892a-85cb-4b51-b41e-50b1e143b042",
  "JobTask": null,
  "User": null,
  "Timestamp": "2021-09-06T14:54:43.239",
  "Type": "selection",
  "_SelectionDetailsTypes": []
}
],
"CustomId": "_Farsound",
"Timestamp": "2021-02-22T09:02:30.08"
},
{
  "Id": "0358b90c-55c5-40af-8cc8-2595b5a7ee0f",
  "Contents": "We improve the lives of those we serve while providing professional value to our partners.
Med-Trans is a part of the Global Medical Response family.",
  "Datasets": [],
  "Annotations": [
    {
      "Id": "19119819-7284-4415-8dff-af4e5a24c9ce",
      "Contents": "improve",
      "StartOffset": 3,
      "EndOffset": 10,
      "Details": "value",
      "ItemId": "0358b90c-55c5-40af-8cc8-2595b5a7ee0f",
      "JobId": "224f892a-85cb-4b51-b41e-50b1e143b042",
      "JobTask": null,
      "User": null,
```