

12<sup>th</sup> Annual South-East European  
Doctoral Student Conference

# Infusing Research and Knowledge in South-East Europe

Edited by:

G. Eleftherakis, P. Gkasis, V. Hatzimpirros, T. Lagkas, Z. Tatsioka



# Proceedings of the 12th South- East European Doctoral Student Conference

Under the 3<sup>rd</sup> Young Researchers' Skills  
Development Week

Edited by

G. Eleftherakis, P. Gkasis, E. Hatzimpirros, T. Lagkas, Z. Tatsioka

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**24 Proxenou Koromila Str., 54622, Thessaloniki, Greece**  
**Tel: +30 2310 253477**  
**Fax: +30 2310 234 205**  
**<http://www.seerc.org>**

## Preface

These proceedings represent the collection of contributions to the eleventh (11th) Annual SEERC Doctoral Student Conference that took place under the 2nd Young Researchers' Skills Development Week (YRW2017) hosted by the University of Sheffield International Faculty, CITY College and organised by the South East European Research Centre in Thessaloniki, Greece.

The annual SEERC Doctoral Student Conference has grown and evolved to the Young Researchers' Skills Development Week. The key aim remains to provide an opportunity for PhD students and young researchers to receive advice from experts in their chosen field of research and to enhance their skills by attending specifically designed workshops and by developing and presenting academic papers. Having identified academic isolation as a problem that many doctoral students face, SEERC aims to bring researchers together for establishing collaborative links between disciplines, for testing the ground for innovative ideas and for engaging the wider academic community.

The audience of the conference expanded beyond the boundaries of South East Europe confirming the need for Doctoral Students to come together, discuss their experiences and gain external feedback for their work as well as listen to the progress and methodology of fellow PhD candidates. The current proceedings comprise of research from Albania, Armenia, Czech Republic, Greece, Italy, Kosovo<sup>1</sup> and F.Y.R. of Macedonia.

We hope that you enjoy the conference.

Dr George Eleftherakis and Prof. Panayiotis H. KETIKIDIS  
General Chairpersons

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<sup>1</sup> This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence".

## **Conference Organization**

The twelfth (12th) Annual SEERC Doctoral Student Conference (DSC2018) that took place under the 3rd Young Researchers' Skills Development Week (YRW2018) was organized by the South East European Research Centre (SEERC), an overseas research centre of the University of Sheffield, established as a non-profit legal entity in Thessaloniki, Greece. SEERC was founded by CITY College, the University's International Faculty, in 2003.

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# Enterprise, Innovation, Development & Politics

# Sustainable Fashion and Digital Communications: A Systematic Literature Review

Ketikidi P. Evangelia<sup>1</sup>

<sup>1</sup>Management School, University of Sheffield, Sheffield, UK

<sup>1</sup>South East European Research Centre (SEERC), Greece

**Abstract.** As the fashion industry is the second global polluter after the oil industry, a strategic approach towards fashion consumption is required (Todeschini et al., 2017, Song et al., 2017, Moorhouse et al., 2017, Armstrong et al., 2016). Several efforts have been widely undertaken in order to promote the consumption of “slow” (or sustainable fashion), however all attempts (i.e. H&M with “Conscious Collection”, Timberland with “Earthkeepers”, Levi’s with “Wellthread Collection”) have not managed to converge customers to purchase sustainable fashion items on a progressive manner. Literature reports that the reasons for failure includes consumers’ low awareness for sustainable fashion, consumers’ concern about the high price and quality of sustainable garments/clothing, industry availability, transparency, consumers’ awareness and convenience in purchasing sustainable fashion clothing (Fashion Revolution Index, 2016; Promoting Sustainable Consumption: Good Practices in OECD Countries, 2008). Therefore, there is a big attention on how sustainable brands are communicating their sustainable profile to their consumers or potential consumers (Pookulangara and Shephard, 2013). This review is necessary to reveal the research gap in this field in order to formulate hypotheses and inquiry areas for future research. In this context, the current study in its initial stage presents a systematic literature review of the relevant published literature in the areas of sustainable fashion, digital communications and social media with the intention to examine published research focusing on analyzing consumers’ reactions towards the online communications channels of sustainable fashion brands. The aim of the current study is to explore current literature review online consumer behaviour and perceptions about sustainable fashion in digital communications.

## *Design/methodology/approach*

This study used a systematic approach based on the methodology that was suggested by suggested by Johnsen et al. (2017) and Yang et al. (2017) in order to collect data and analyse related literature. Three key steps were included in the approach. The first step was to identify the key authors that publish in mostly peer-reviewed with the specific topic and reviewed their articles before undertaking a comprehensive research. The second step was to develop a search strategy using keywords/terms to search academic journal articles (peer-reviewed) that are related to sustainable fashion, digital marketing and online consumer

perceptions. All of these search terms were checked in the titles, keywords and abstracts of journal articles using inclusion “criteria” “exclusion criteria” indepth reading and content mapping, undertaking an electronic literature search which was conducted on February 2018 (Web of Science, Scopus, EBSCO, Google Scholar, IngentaConnect and other publishers). The last step was to select the articles using the references that were identified from other related academic journal papers. Due to the infancy of this research area, there was limited articles related to sustainable fashion industry before 2006. The majority of the papers related to the study were written after 2016, the time frame of the research was from 2006 to 2018.

#### *Findings*

This systematic review provides a holistic approach on how sustainable fashion clothing brands are communicating their sustainable profile to their consumers or potential consumers. Moreover, the results of this literature review highlights that the negative effects of “fast fashion” on the environment can be based on the lack of consumers’ knowledge about fashion sustainability and stress out that the industry of fashion is influenced in economic, social and environmental dimensions. However, the study revealed that mass and social media could prove to be a valuable medium to create awareness amongst this market. In addition, researchers claim that future research should measure the relationship between perceptions of self and ethical purchasing behaviours. Based on the outcomes of the systematic review the following research questions can be formulated: (1) Why fast fashion and sustainability may be considered as two opposite concepts or an oxymoron? (2) How sustainable or “slow” fashion can influence the industry of fashion in a successful economic, social and environmental perspective? (3) How new digital technologies (such as social media) may assist fashion marketing communications? (4) How digitally delivered messages can influence consumers’ perception purchasing sustainable fashion products? (5) How sustainable brands are communicating their sustainable profile to their consumers or potential consumers? (6) Why sustainable fashion brands have to be cautious and wisely choose specific social media channels when creating their online communication strategy?

#### *Practical Implications*

The implications of the systematic review for academia are confirmed research gaps in the field of sustainable fashion promotion which currently fails. Also, for academia and innovators this study will enrich the literature on sustainable consumption strategies and indirectly contributing to the research on resource efficiency and sustainability in supply chains (on the consumption side). For industry, this systematic review could provide best practices that could be used by companies in relation to their online channels and support for the digitalization of industrial business models (as a response to customer demands). For the consumers and the society, the current systematic review consists of supporting and enriching the research regarding the digitalization of industrial business models (as a response to customer demands).

#### *Research limitations*

Regardless of the rigor that was followed alongside the systematic literature review methodology, several limitations have been met. Firstly, in this initial stage the data collection is limited collecting insights only from the online

environment. Also, due to various synonyms used by authors to describe sustainable fashion (i.e. apparel, sustainable fashion, fast fashion, slow fashion etc.) some potentially relevant papers may not be included. Other important limitations of the current literature review may be bias towards the inclusion/exclusion criteria for the articles, bias derived from starting the literature search based on the key influencing authors and last limited knowledge on this topic which may yield inconsistent and inaccurate findings.

**Keywords:** Sustainable Fashion, Sustainability, Ethical Fashion, Slow Fashion, Digital Communication, Online Marketing, Social Media, Systematic Literature Review

## 1 Introduction

Considering the harsh environmental impacts of the fashion industry in nowadays society – being the second global polluter after the oil industry – sustainability in the fashion industry is becoming a central research focus of both academia and industry. Several scholars (Todeschini et al., 2017, Song et al., 2017, Moorhouse et al., 2017, Armstrong et al., 2016) due to the fact that the fashion industry is the second global polluter, a strategic approach towards fashion consumption is required. Efforts have been widely undertaken in order to promote the consumption of “slow”/ sustainable fashion. However, consumers were not converged to purchase sustainable fashion items, due to low awareness for sustainable fashion, the relationship between high price and quality of sustainable clothing, industry availability, transparency, etc.

Nowadays the market dynamics, consumerism-based society, researchers in this field focus on understanding the paradigm shift adopted by contemporary industries towards fashion production and consumption (Song et al., 2017; Jung et al., 2016; Oncioiu, 2016). Through the years clothing has become really easy to find and very affordable. In the early 1960’s consumers started to be more aware about the impact that their consumption may have in the environment whereas, the first anti-fur campaigns were first started in 1980s. In the nineties, there was a remarkable focus on eco-friendly materials, such as unbleached cotton and it was that particular time when consumers recognised the bad impact that over consumption may have on the environment. In the 1990’s a large number of sweatshop scandals became known (such as the children labour in 1996, from the colossal company – Nike) and that pressured a lot the fashion brand companies to monitor and develop new, better and more ethical programs through their factories (Business for Social Responsibility, 2012; Hethorn and Ulasewicz, 2008). In such a pressuring context, sustainable fashion research becomes of utmost importance and the numbers of published work in this field grows exponentially in order to provide answers to these challenges. Research (McNeill and Moore, 2015; Lo et al., 2012; Chan and Wong, 2012; Gam and Banning, 2011; de Brito et al., 2008;) confirms that nowadays fashion is a very fast-paced industry and a key economic contributor (Henninger et al., 2017), which in order to maintain high throughput levels, affects the surrounding environment (including society) in an unjust way (McNeill and Moore, 2015; Moon et al., 2015; Claudio, 2007).

Furthermore, research shows that there are various approaches towards mitigating the environmental impact of the fashion industry and these approaches range from hard supply chain/production systems re-engineering to other softer approaches aimed at tackling consumer behaviour (i.e. targeted digital marketing, etc.). For example, Fatema (2014) claims that digital marketing (as means of targeting consumers through digital channels) enables companies to attract and target a specific audience, interact with it through digital media and then measure the results. Schivinski and Dabrowski (2016) state that digital marketing provides the opportunity after attracting the targeted audience, to interact with it through digital media. In addition, Minton et al., (2012) highlight that digital marketing and specifically social media have a significant influence on fashion and more specifically on the sustainable fashion industry. Several scholars (Phua et al., 2017; Henninger et al., 2017; Latiff and Safiee 2015; Parrott and Danbury, 2015; Kontu and Vecchi, 2014) highlight the importance and effectiveness of social media for online green marketing and advertising, due to the fact that through social media analytics, companies and advertising agencies can collect consumers' personal characteristics (e.g., interactions, networking, interpersonal relations). In addition, social media is able to develop a more tailored and personalised buyer persona which leads to a more effective consumer behaviour analysis and understanding (Phua et al., 2017; Henninger et al., 2016). The role of social media has enriched and assisted the integrated communication in the fashion industry by reaching the main goals of brand awareness and consumers' engagement. Nevertheless, the variety of available social media platforms (Facebook, Twitter, Instagram, LinkedIn, Pinterest, Snapchat etc.) have different communication patterns and different target audience based on age, education background, gender, interests, etc. As a result, sustainable fashion brands while creating their online communications strategy, need be cautious and wisely select the appropriate social media strategy that could reach their target audience in terms of interests and other demographic characteristics (Phua et al., 2017; Vaterlaus et al., 2016).

The main research of this study is to examine the academic debates about sustainability in the fashion industry and to explore how sustainable brands are communicating their sustainable profile to their consumers or potential consumers through social media channels. In this process, the focus will be set on academic articles examining how fashion brands are disseminating online their profile/messages towards consumers, especially through social media and how these messages may affect consumers' response, perception and purchase behaviour towards sustainable fashion clothing. The ultimate objective is to reveal research questions that can set the directions for future research in this field.

The structure of current paper consists of the following six sections. The first section presents the introduction and research objective of this study, the second section lays out the review approach that was adopted in the systematic literature review methodology, the third section presents definitions of sustainable fashion, the fourth section comprises the two main research areas (sustainable fashion and digital communications), the fifth section provides the summary and implications of the systematic literature review and the last section presents the conclusions of this study and future prospects of the research field.

## 2 Systematic Literature Review Methodology

This study used a systematic literature review approach, to examine previous literature related to the topic of the research under investigation. According to Karaosman et al., (2017) a systematic literature review is a form of secondary study which aims to minimise researcher bias regarding the exclusion or the inclusion of studies. A systematic literature review leads to a targeted analysis of research gaps, while providing a scientifically valid approach towards formulating hypotheses and research questions. When selecting the systematic literature review methodology, it is important to consider the interaction of the area under inquiry sustainable fashion and digital communications with the theoretical foundations of this topic. By blending the theoretical foundations with the area under inquiry, researchers should ensure a more balanced resource-selection approach that would follow the proper philosophical foundation of the phenomenon (Srivastava, 2007).

The current systematic literature review was organised in four stages - following some particular specifications/limitations. The first stage was to establish the search strategy in one basic search set and two subsets. The basic search set includes keywords related to Sustainable Fashion, the first subset searched for Digital Communications in the fashion industry and the second subset is a combination of search terms for Digital Communications, including Digital Marketing and Social Media in the fashion industry. The searching strategy was based on related articles only in English language, in a specific time frame from 2006 until 2018. The year 2006 is the starting point of the research, due to the fact that limited articles were published related to sustainable fashion industry before 2006.

Regarding the sources, the second stage of this systematic literature review was focused on further filtering based on individual resource-based keywords. The search process was based on an advanced search mode, using the three basic Boolean Operators – Table 1 (Ely and Scott, 2007). All of the search terms were checked in the titles, keywords and abstracts of journal articles using “inclusion criteria” “exclusion criteria”, in-depth reading and content mapping, undertaking an electronic literature search which was conducted on February 2018 (Web of Science, Scopus, EBSCO, Google Scholar, IngentaConnect and other publishers).

**Table 1.** The Search Strings - Boolean Operators

<b>FASHION</b> Keywords: (Fashion OR Clothing OR Apparel)
<b>AND</b> <b>SUSTAINABLE</b> Keywords: (Sustainable OR Sustainability OR Green OR Ethical OR Eco)
<b>AND</b> <b>Context</b> or <b>DIGITAL COMMUNICATIONS</b> Keywords: (“digital communications” OR “digital marketing” OR “internet marketing” OR “online marketing” OR “social media” OR “digital media”)

**AND NOT:**

("Organic" OR "Fair Fashion" OR "Integrated Marketing Communications" OR "Virtual Communities" OR "Social Web")

The Search String Strategy was set in one basic search set and two subsets. The basic search set included the following keywords Sustainable Fashion/ Sustainability, the first subset Digital Marketing in the fashion industry and the third subset included Social Media in the fashion industry (Table 2).

**Table 2.** Sustainable Fashion and Digital Communications - SCOPUS Database (2006 -2018)

<b>Keywords</b>	<b>Fields</b>	<b>Subject Areas</b>	<b>Quantity</b>
(Sustainable OR Sustainability OR Green OR Ethical OR Eco) AND (Fashion OR Apparel OR Clothing OR Slow OR Fast) AND ("Digital Communications" OR "Digital Marketing" OR "Online Marketing" OR "Internet Marketing" OR "Digital Media" OR "Social Media")	All	All	2935
(Sustainable OR Sustainability OR Green OR Ethical OR Eco) AND (Fashion OR Apparel OR Clothing OR Slow OR Fast) AND ("Digital Communications" OR "Digital Marketing" OR "Online Marketing" OR "Internet Marketing" OR "Digital Media" OR "Social Media")	All	Business Management and Accounting, Soc. Sciences	1843
Sustainable Fashion AND Digital Communications	All	All	405
Sustainable Fashion AND Digital Communications	All	Business Management and Accounting, Soc. Sciences	308
(Sustainable OR Sustainability OR Green OR Ethical OR Eco) AND (Fashion OR Apparel OR Clothing OR Slow OR Fast) AND Digital Communications OR (Digital OR Online OR Internet) Marketing OR (Digital OR Social) Media	Title, Abstract, Key-words	All	90



(Sustainable OR Sustainability OR Green OR Ethical OR Eco) AND (Fashion OR Apparel OR Clothing OR Slow OR Fast) AND (“Digital Communications” OR “Digital Marketing” OR “Online Marketing” OR “Internet Marketing” OR “Digital Media” OR “Social Media”)	Title, Abstract, Key-words	All	76
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In the third stage of this literature review research, any field was included involving results from anywhere in the article and then narrowed down the research by searching on title, abstract, keyword and subject/topic and more specific subject areas such as business management / accounting and social sciences. The source and documents that were used are articles and book chapters, including academic journal articles, research articles, e-book chapters (i.e. Springer - Routledge - Greenleaf Pub & GSE Research) and excluding reports, news, trade publications, reviews and magazines). Through the research process a variety of resources were used such as databases (Web of Science, Scopus, EBSCO), search engines/platforms (Google Scholar, IngentaConnect) and other publisher platforms (EmeraldInsight, Springerlink, Taylor & Francis, Elsevier Science and Wiley).

The two main research areas that are covered in this study are sustainable fashion and digital communications. As it was mentioned above, based on the systematic literature review methodology, before setting any limitations through a number of resources (Web of Science, Scopus, EBSCO, Google Scholar, IngentaConnect, etc.) the search identified 3,302 publications for sustainable fashion and 20,964 for digital communications, in total. However, when the research string included both sustainable fashion and digital communications without setting any limitation then the quantity of articles were narrowed to 985 articles. After setting several limitations (time frame, language, keywords, title, abstract, etc.) the quantity of articles for sustainable fashion and digital communications were limited to 347 articles (Table 3).

**Table 3.** Sustainable Fashion (SF) and Digital Communications (DC) - Number of Articles per Resource

Resource	Sustainable Fashion (key-word)	Digital Communications (key-word)	SF and DC (combined search terms)	SF and DC (combined search terms and inclusion criteria: Title, Abstract, Keywords)	SF and DC (combined search terms and inclusion criteria: Title, Abstract, Keywords, Subject Terms)
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Web of Science	386	1323	367	101	79
Scopus	108	1159	308	90	76
EBSCO	85	267	49	41	19
Google Scholar	2060	17.800	215	130	130
Ingenta-Connect	597	118	23	23	23
Other publishers	66	297	23	22	20
TOTAL	3302	20964	985	407	347

The last stage contained the selection process were exact duplicates and irrelevant sources were removed from the research. An in-depth reading of articles has been performed in order to identify empirical evidence related to the problem context and field boundaries adopted by this paper. The articles have been analysed from the point of view of their hypotheses, employed methodology and its scientific validity, relation to building theoretical contribution (besides practical), findings and finally research limitations/gaps and proposals for future research (Table 4). As a result, through this extended systematic literature review there is a variety of scholars which are describing/defining sustainable fashion in many different ways.

**Table 4.** Sustainable Fashion and Digital Communications - Number of Articles per Resource (final redundancy with all limitations: time frame, language, resource type: peer-review, document type, subject areas, keywords)

Keywords	Quantity of Articles for Sustainable Fashion and Digital Communications
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	(title, abstract, keywords)
Web of Science	76
Scopus	79
EBSCO	19
Google Scholar	130
Ingenta-Connect	23
Other publishers	20
TOTAL	347 (creation of and title/abstract/keyword Index) 169 items removed = duplicates and not relevant to the research) (178 selected for reading)

### 3 Definitions of Sustainable Fashion

“Ethical fashion” and “Eco fashion” are not the same. Joergens (2006) defines “Ethical fashion” as: fashionable clothes that incorporate fair trade principles with sweatshop-free labour conditions while not harming the environment or workers by using biodegradable and organic cotton (p. 361).

Several authors (Carey and Cervellon, 2014; Cervellon et al., 2010) highlight that sustainable fashion is known as the part of the slow fashion movement, also known as “eco fashion” or “green fashion” or “ethical fashion” or “organic. Based on Souza (2015) “eco fashion” or “environmental fashion” does not only refer in being friendly to environment, but also to repair the environment for the forthcoming generations. Several authors (Ochoa, 2011; Claudio, 2007; Joergens, 2006) claim that “eco fashion” is a way of creating clothing that helps the society not harming the environment. According to Clark (2008) “slow fashion” and “ethical fashion” are two terminologies that can be aligned. The term “slow” refers to sustainable and ethical ways through the production and consumption of clothes, such as in “ethical fashion”, whereas Cervellon and Wernerfelt (2012) define sustainable fashion as “green fashion”.

However, Fletcher (2008) prefers to use the term “slow fashion” rather than “eco – fashion” claiming that “slow fashion” refers more to the philosophy behind sustainability and the impact that sustainable fashion has in an environmental, social and economic

dimension. Moreover, Clark (2008) claims that sustainable fashion is often described as an oxymoron, due to the fact that sustainable fashion is the opposite of fast fashion. Pookulangara and Shephard (2013), Bourland (2011) and Shen et al., (2012) define sustainable fashion as an abstract idea, producing fashion products based on sustainability values, with a great concern about working/social conditions and environmental obligation. Baumgartner (2009) states that the most cited definition about sustainability is the following:

“meeting the needs of the present without compromising the ability of future generations to meet their needs” (WCED, 1987).

Another scholar, Fletcher (2010) states that “fast” is not always equal to unsustainability, unethical and nonenvironmental friendly practices. The author highlights that sustainability is the tool for the big brands to follow the economic systems and the successful business models, increasing sales and delivering economic growth. In addition, several authors claim that there is a high need to research of how fast fashion can be environmentally and socially correct (Henninger et al., 2016; Moon et al., 2015; McNeill and Moore, 2015; Fletcher, 2010).

Regarding the term “slow” /sustainable fashion, de Brito (2008) and Henninger et al. (2017) underline that the industry of fashion is influenced in an economic, social and environmental dimension. Slow fashion has been defined variously:

- Slow Fashion concept is based on sustainability within the fashion industry and design incorporating high quality, small lines, regional productions, and fair labour conditions (Slow Fashion Award, 2010)
- Slow Fashion garments are intended to be worn for a long time and create a personal connection with the wearer (Holt, 2009a)
- Slow Fashion is not about responding to trends, it is a change of mentality that involves thinking about the origin of the garment and buying something that won't look unfashionable after one season (Wood, 2009)

## **4 Two Main Research Areas**

### **4.1 Area 1: Sustainable Fashion**

There is an increasing literature evidence claiming that the fashion industry is one of the biggest markets at a global scale (expected to reach the tremendous value of 2.1 Trillion USD by 2025) and which poses ethical dilemmas in relation to its social and environmental impact (Ciasullo et al, 2017; Henninger et al., 2017; Lundblad and Davies, 2016; McNeill and Moore, 2015; Shen et al., 2014; Fletcher, 2010). Several studies indicate that clothing industry is the second biggest global polluter after the oil industry as clothes are basically composed of 40% cotton (which requires massive amounts of water to ensure productivity) and 60% polyesters/chemicals (which are made of oil and burn high amounts of energy in order to ensure their processing (The Henninger et al., 2017; Business of Fashion, 2016; CDP, 2015; WRAP, 2012).

Several scholars (McNeill and Moore, 2015; Lo et al., 2012; Chan and Wong, 2012; Gam and Banning, 2011; Carbone and Blanquart, 2008; de Brito, 2008) state that fashion is a very fast-paced industry and a key economic contributor (Henninger et al., 2017) which in order to maintain high throughput levels, affects the surrounding environment (including society) in an unjust way (McNeill and Moore, 2015; Moon et al., 2015; Gam and Banning, 2011; Claudio, 2007). However, according to Fletcher (2010) “fast” is not always equal to unsustainability, unethical and non-environmental friendly practices. Several authors claim that sustainability in the fashion industry will assist big brands to follow the economic systems and the successful business models, increasing sales and delivering economic growth. The authors state that there is a huge need for in depth research to investigate how fast fashion could be environmentally and socially fair (Henninger et al., 2015; Moon et al., 2015; McNeill and Moore, 2015; Fletcher, 2010).

In the last two decades the issue of sustainability in the fashion industry has received significant attention, both from the consumers’ side and the fashion stakeholders’ side. According to several authors (Ciasullo et al., 2017; Shen et al., 2014) the stakeholders in the fashion industry can be fashion producers, policy makers, influencers, employees, distributors, suppliers, local communities, designers, manufacturers, buyers and retailers. Whereas in the fashion supply chain some of the stakeholders are service providers, the textile industry, the recycling industry, the retail sector, the apparel industry, machinery and technology suppliers, the chemical fiber industry (de Burito et al., 2008). Cervellon et al. (2010) states that there are several attempts to explain/define the term “sustainable fashion”, such as “organic fashion”, “fair trade fashion”, “slow fashion”, “eco – fashion”, “green fashion”, “fashion with a conscience”, “ethical fashion”. However, according to Henninger et al., (2017) sustainability is not a new phenomenon. The first anti - fur campaigns were first started in 1980s, whereas in the late 1990’s a large number of sweatshop scandals became known and that pressured a lot the brand companies to monitor and develop new, better and more ethical programs through their factories (Business for Social Responsibility, 2012). A good example could be the Rana Plaza factory in Bangladesh, which collapsed in 2013 and housed five garment factories supplying global brands (clothing factories, a bank, apartments, and several shops). In this tragedy, a number of 1,135 people were killed by higher management having neglected social & safety working norms (The Guardian, 2013).

Nevertheless, based on Lundblad and Davies (2015) fast fashion and sustainability may be considered as two opposite concepts or an oxymoron. Sustainable fashion is a part of “slow” fashion (Henninger et al., 2016), which has been developed over the past decades. McNeill and Moore (2015) highlight that the main elements which distinguish consumption between “fast” and “slow” fashion are price, value, trends and brand image. Hence, sustainable or “slow” fashion may influence the industry of fashion in an economic, social and environmental dimension (Henninger et al., 2017; de Brito, 2008). Thus, The challenge resides in identifying effective ways of shifting the current unjust fashion industry towards a socially friendly and sustainable approach. However, embedding sustainability into the fashion industry it is not something that can be accomplished easily, due to the fact that fashion is constantly changing. Many authors (McNeill and Moore, 2015; Pedersen and Andersen, 2015; Moon et al., 2015; Ertekin and Atik, 2015; Gam and Banning, 2011; Goworek, 2011; Lo et al., 2011) claim that

the current fashion industry is producing harmful impacts towards the society and the environment. Sustainability in fashion is an essential prerequisite for the future development of the fashion industry. As Carey and Cervellon (2014) highlight, fashion is a fast-moving industry and on the other hand sustainable fashion is known as the part of the slow fashion movement, also known as eco-, green-, ethical- fashion. Pookulangara and Shephard (2013) and Bourland (2011) highlight that slow fashion reflects to an abstract idea that focuses on sustainability values, such as good working conditions and environmental devastations. According to research (Henninger et al., 2015;

Moon et al., 2015; McNeill and Moore, 2015; McNeill and Moore, 2015; Cervellon and Wernerfelt, 2012; Chan and Wong, 2012; Lo, Yeung and Cheng, 2012; Gam and Banning, 2011; Fletcher, 2010; Blanquart, 2008; de Brito, 2008) sustainable fashion is not just a trend, but a way of living. In the very fast pacing fashion industry, sustainable fashion may be perceived as an oxymoron. However, sustainable clothes can be modern, up – to – date, following fashion trends and at the same time using no sweatshop labour conditions and friendly to the environment textiles.

In conclusion, many authors (McNeill and Moore, 2015; Pedersen and Andersen, 2015; Moon et al., 2015; Ertekin and Atik, 2015; Gam and Banning, 2011; Goworek, 2011; Lo et al., 2011) claim that the current fashion industry is producing harmful impacts towards the society and the environment. Sustainability in fashion is an essential prerequisite for the future development of the fashion industry. As several authors (Carey and Cervellon, 2014) highlight fashion is a fast-moving industry and on the other hand sustainable fashion is known as the part of the slow fashion movement, also known as eco-, green-, ethical- fashion). Yet, media promote sustainable fashion as garments that are “less fast” (Pookulangara and Shephard, 2013).

To this end the research questions of this area are:

- Why fast fashion and sustainability may be considered as two opposite concepts or an oxymoron?
- How sustainable or “slow” fashion can influence the industry of fashion in a successful economic, social and environmental perspective?

#### **4.2 Area 2: Communication Strategies and Digital Marketing in the Fashion Industry**

According to Constantinides (2006) the market in order to be sustainable, profitable and to enhance the demand for the products, it utilises the traditional variables of marketing mix, which are the four (4) P’s: product, place, price, promotion. The fashion marketing mix focuses a lot to each of the four (4) P’s. The product is a basic and fundamental element for the fashion industry or the fashion brand (merchandise, fashion shows, etc.). Promotion on a fashion product can be implemented through online and offline promotional methods (print, billboards, social media etc). However, Easey (2009) states that a successful fashion marketing concept must be equally concerned about the design of the product, the customers and the profits of the company. Easey (2009) defines fashion marketing as:

“... the application of a range of techniques and a business philosophy that centres upon the customer and potential customer of clothing and related products and services in order to meet the long-term goals of the organization.”

Nowadays there are many new digital technologies and innovations which may assist the adoption of sustainable solutions and challenges (Fatema et al., 2014). Digital marketing is the type of marketing, which is used to promote widely products or services to customers who use digital channels. With the effective use of digital marketing the companies can attract and target a specific audience, interact with it through digital media and then measure the results.

“Digital capabilities have helped Nike to improve visibility and performance in its operations, increasing efficiency, reducing waste, and enhancing Corporate Social Responsibility in the company’s global

Supply Chain.” (Westerman, 2014).

According to the above statement, new digital technologies and innovations can assist the adoption of sustainable solutions and challenges by providing the necessary content-delivery platform. Fatema et al., (2014), define digital marketing as the type of marketing, which is used to promote widely products or services to customers who use digital channels. Also, digital marketing gives the opportunity after attracting the targeted audience, to interact with it through digital media. In digital marketing, these channels can be mobile phones, social media marketing, search engine marketing and many more digital media channels. Chandola (2015) highlights that the digital transformation (digital era) influences enormously the sustainability features in an industry of organisation. In addition, the author claims that digitalisation and sustainability are both integral parts for a viable organisation. Furthermore, the increasing amounts of online fashion customers provides an important and main role of the digital marketing techniques.

To this end, the research questions of this area are:

- How new digital technologies (such as social media) may assist fashion marketing communications?
- How digitally delivered messages can influence consumers’ perception purchasing sustainable fashion products?

#### **4.2.1 The Role of Social Media in the Fashion Industry**

According to Minton et al., (2012) social media have a significant influence on fashion. Social media are a very effective way of online marketing and advertising, due to the fact that through social media analytics companies and advertising agencies can collect consumers’ personal characteristics (e.g., interactions, networking, interpersonal relations). Furthermore, social media are a basic communication tool of digital marketing, which allow interactivity, better and more effective targeting, easier access to consumers interests and creating customised advertisements with little cost (Parrot et al., 2015) – compared to traditional communication means (TV, magazines, newspapers). Therefore, social media is one of the most appropriate online communication mean in order to reach and interact with the correct target audience (Brodie et al., 2013). Moreover, Hung, Li and Tse (2011) state that online media compared to print media evoke more emotional and affective responses due to the way that messages are being disseminated

- intrinsic (e.g., print) versus extrinsic (e.g., electronic). This means, that electronic and virtual imaging in comparison to print media (i.e. newspapers, magazines, journals, newsletters, and other printed material) or broadcast media (i.e. radio, television) capture more easily humans' attention. However, it has to be highlighted that there is a variety of social media (Facebook, Twitter, Instagram, LinkedIn, Pinterest, Snapchat etc.) that have different communication patterns and different target audience based on age, education background, gender, interests (Phua et al., 2017, Smith et al., 2012). When sustainable fashion brands create their online communication strategy need to be cautious and wisely choose the social media platforms that could assist reaching their target audience in terms of interests and other demographic characteristics. Thus, this poses a research gap as brands are still struggling with their digital campaigns (Kontu and Vecchi, 2014). Several scholars' claim (Kontu and Vecchi, 2014; Kim and Ko, 2010, 2012) that through the last decade social media have become an integral part in the communication strategy of the fashion brands. The role of social media has enriched and assisted the integrated communication in the fashion industry by reaching the main goals of brand awareness and consumers' engagement.

Kaplan and Haenlein (2010) highlight that there are six different types of social media:

1. collaborative projects (e.g. Wikipedia),
2. blogs and microblogs (e.g. Twitter),
3. content communities (e.g. YouTube),
4. social networking sites (e.g. Facebook),
5. virtual game worlds (e.g. World of Warcraft) and
6. virtual social worlds (e.g. Second Life)

Nevertheless, in the fashion industry which is mainly focused on the visual content and the aesthetics, visual platforms and social networking sites such as Pinterest, Facebook, Instagram have a main role in digital marketing strategy (Wolny and Mueller, 2013; Workman and Caldwell, 2007). Mandsen and Slatten (2015) state that in the fashion industry traditional print media were the protagonists' through the last years. However, nowadays the role of social media has a very important role in the diffusion and dissemination of the digital strategy ideas and concepts. Based on a current research (Sensis Social Media Report, 2017) Australians' social media penetration reached 79%, which means that eight (8) to ten (10) Australians are now on the social media. The most popular social media platforms for the year 2017 were: Facebook (94%), Instagram (46%), Snapchat (40%), Twitter (32%), LinkedIn (18%), Pinterest (10%) and last Google+ (10%).

To this end, the research questions of this area are:

- How sustainable brands are communicating their sustainable profile to their consumers or potential consumers?
- Why sustainable fashion brands need to be cautious and wisely choose specific social media channels when creating their online communication strategy?



## 5 Summary of the Systematic Literature Review

Regarding research area two (2) and area three (3) the increasing amounts of online fashion customers and the role of digital marketing techniques are very important, besides the traditional offline media. Through the era of digital transformation online communications highly influence sustainability in an industry or organisation. Vien (2015) states that currently content marketing is a worldwide trend applied by many companies in order to draw more potential customers to their website and to increase awareness and engagement with the customers through social media channels. When a company is engaging with its customers through social media channels, it has the opportunity to stay informed about customers' needs, to raise company's profile, to reduce costs and to reach more customers worldwide (Yasmin et al., 2015). On the other hand, customers through digital marketing channels (social media) have the opportunity to stay updated with products or services, to have stronger greater engagement company's activities, to be always informed about the products or services, to make comparison with other similar products or services, to shop any time from everywhere, to easily share content of the products or services and to instantly purchase the product or service they want. Digital marketing and as an extension social media are tools, which help and boost the traditional advertising activities/methods and increase sales. Moreover, Henninger et al. (2016) state that social media platforms are a cheap pathway to reach wider and a more target audience. Thus, there is a big research gap and a promising solution to fill in terms of exploring whether digitally delivered messages (digital marketing as platform) can influence consumers' perception on purchasing sustainable fashion products.

To summarise, the following table provides a systematic literature review including the research area, research gaps, the research questions and the key authors that published related academic papers to the study.

**Table 5.** A summary of the systematic literature

Area	Gaps	Research questions	Key authors
1. Sustainable Fashion	Investigation of consumers attitudes/purchasing behavior for sustainable fashion brands	<ul style="list-style-type: none"> <li>• Why fast fashion and sustainability may be considered as two opposite concepts or an oxymoron?</li> <li>• How sustainable or "slow" fashion can influence the industry of fashion in a successful economic, social and environmental perspective?</li> </ul>	Henninger et al., 2017; de Brito, 2008; Lundblad and Davies, 2015; Kronrod et al., 2012; Young et al., 2010; Lillley et al., 2009; Wever et al.,

			2008; Vermeir et al., 2006)
2. Communication Strategies and Digital Marketing in the Fashion Industry	Explore solutions/ways to disseminate in an effective way messages about sustainable fashion through digital marketing communications	<ul style="list-style-type: none"> <li>• How new digital technologies and innovations may assist fashion marketing communications?</li> <li>• How digitally delivered messages can influence consumers' perception purchasing sustainable fashion products.</li> </ul>	Chandola, 2015; Fatema et al., 2014
3. Social Media in the Fashion Industry	There is a lack of research on how and if social media communication can influence consumer attitudes/perceptions of brands and therefore of sustainable fashion brands	<ul style="list-style-type: none"> <li>• How sustainable brands are communicating their sustainable profile to their consumers or potential consumers?</li> <li>• Why sustainable fashion brands need to be cautious and wisely choose those social media when creating their online communication strategy?</li> </ul>	Schivinski and Dabrowski, 2016; Kahle and ValetteFlorence, 2012; Hung, Li, and Tse 2011

## 6 Conclusions

In conclusion, as it was stated by several authors (Moorhouse and Moorhouse, 2017; Henninger 2016, Khurana and Ricchetti, 2015) the fashion industry is considered as the second bigger environment polluter after the oil industry. Through the last decade consumers have been more concerned about the social and environmental impact of their purchases and on the other hand the fashion industry begins to consider how harmful

their activities might be in an environmental, social and economic perspective. Based on studies in the literature review, it can be said that the investigation of online consumer behaviour in the fashion market is a very fruitful for more indepth research, due to the fact that we are coming through a digitalised era. Cowden (2014) states that “traditional marketing seems take a backseat”, meaning that traditional marketing is not enough in order to create successful marketing strategies. Nowadays, online communications occupy an important amount of time and money in the application and implementation of an online marketing strategy plan. Digital communications are an integral part in an integrated marketing mix of a brand. Nevertheless, there is there is a lack of research on how sustainable fashion brands can disseminate in an effective way online messages about their sustainable actions and strategy (Moon et al., 2015). Moreover, according to Minton et al. (2012) social media have a significant influence on fashion and specifically on sustainable fashion and there is the need for further investigation on how social media can influence consumer attitudes/purchasing behaviour towards sustainable fashion brands (Schivinski and Dabrowski, 2016). The implications of the systematic review for academia consists of enriching the literature on sustainable fashion and digital communications strategies. For industry, this systematic review can provide best social media practices to enlighten consumers towards sustainable fashion. For the consumers and the society, the current systematic review enhances their knowledge on the social and environmental issues related to sustainable fashion.

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# An overview of price promotion influence on purchase intention: The moderating role of math anxiety

Yllka Hoxha<sup>1</sup>

<sup>1</sup>PhD student in Economics, University of Gdansk, Poland

**Abstract.** Recently, the notion of price promotion has grown interest and attention by academics and practitioners. Marketers frequently use price promotions in order to increase sales. Nowadays, companies spend a huge amount of money to communicate price promotions campaigns. In addition, the way of presenting a price reduction is a crucial factor for retailers and manufacturers due to its influence in consumers' behavior. The main purpose of the paper is to address and review existing empirical findings regarding price promotion and purchase intention and give suggestions for marketers to set the most appropriate ways to provide price promotion. The paper will begin by an overview of price promotion influence on purchase intention. In addition, it deals with the moderating role of math anxiety on purchase intention. Finally, it will draw implications for marketers how to implement price promotion strategies in order to attract customers and increase sales; and propose suggestions for further research to examine the relationship between proposed variables in the context of price promotion. However, the following study presents a research at the initial phase, hence the research objectives will be achieved by analyzing the available theory.

**Keywords:** Consumer behavior, price promotion, purchase intention; math anxiety.

## 1 Introduction

The use of price promotion has been increased in the market nowadays with the aim to face high competition. As price is one of the key factors of consumers' purchase decision and behavior (Krishna/Briesch/Lehman/Yuan 2002, p. 101) marketers offer price promotions with the intention to attract consumers into stores and increase sales (Chapman 1993, p. 1; Darke/Chung 2005, p. 35; Gupta/Cooper 1992, p. 40). Generally speaking, in the recent years companies have spent a huge amount of money to communicate price promotions (Hardesty/Bearden 2003, p. 17). The most important factors of price promotion are: depth, duration and frequency of the price reduction

(Fibich/Gavious/Lowengart 2007, p. 570). Marketers face two questions while offering price promotions: how much to reduce the price and in which way to provide price promotions (Della Bitta/Monroe/McGinnis 1981, p. 416). In order to solve these questions, they should understand how consumers perceive promotions and they should take into account the advantages and disadvantages while designing and implementing price promotions.

Despite positive effects of price promotion on consumer perception of the offer value and on purchase intention (Heardesty/Bearden 2003, p. 17), there are also negative influences which result in lowering the preference for the brand. Hence, for retailers the way of presenting a price promotion is a crucial factor due to its influence on consumers' behavior. An inappropriate presentation of price promotion leads to negative consumer evaluation and therefore to lower profit and sales (Chapman 1993, p. 8).

### **1.1 The overall objective of the study**

In order to be competitive in the market, marketers could provide different types of promotions. It is very important to offer a price promotion that consumers perceive positively because price is the crucial factor of sale (Krishna/Briesch/Lehman/Yuan 2002, p. 101). Marketers frequently use price promotions presentation (e.g. "amount-off" and "%-off") in order to increase sales by promoting savings on regular price of the products (Suri/Monroe/Koc 2012, p. 279).

The main purpose of the paper is to review and analyze existing empirical findings regarding price promotion and purchase intention and give suggestions for marketers to set the most appropriate ways to provide price promotion. The paper will begin by an overview of price promotion influence on purchase intention. In addition, it deals with the question whether price promotion influence purchase intention, and if so, under which conditions. Furthermore, it will explore the moderating role of math anxiety on purchase intention. However, the research presents a research at the initial phase, hence the research objectives will be achieved by analyzing the available theory. Finally, the paper will try to draw implications and propose suggestions to examine the relationship between proposed variables for further research in the context of price promotion.

## **2 Literature review**

### **2.1 Theoretical background of price promotion**

As the price is one of the key determinants of sale (Krishna/Briesch/Lehman/Yuan 2002, p. 101), price promotion should be presented in the best way to attract consumers into stores. Due to an increased competition in the markets in the last decades, retailers have increased the use of price promotion with the intention to increase sales (Chapman 1993, p. 1).

A substantial amount of research has been focused on different ways of price promotion communications (e.g. Chen/Monroe/Lou 1998, p. 354; Della Bitta/Monroe/McGinnis 1981, p. 416; Krishna/Briesch/Lehman/Yuan 2002, p. 101). Several types of price promotion do exist (Krishna/Briesch/Lehman/Yuan 2002, p. 101). In the context of price promotion, retailers can present a price reduction as "%-off" format or "amount-off" format or using a combination of percentages and amounts. Despite different types of price promotion, the focus of this paper is on the price presentation format ("%off" vs. "amount-off"). In fact, a variety of price promotion types provide benefits to customers by affecting perception of promotion value and current choice



(Chen/Monroe/Lou, 1998, p. 354). Hence, the way of presenting a price reduction is a crucial factor for retailers and manufacturers due to its influence in consumers' behavior. In general, an inappropriate presentation of price promotion leads to negative consumer evaluation and therefore to lower profit and sales (Chapman 1993, p. 8). Due to this reason, retailers should deeply analyze consumers' needs and implement adequate promotion types in order to increase effectiveness in the marketplace (Krishna/Briesch/Lehman/Yuan 2002, p. 101).

## **2.2 Theoretical background of purchase intention**

Purchase intention can be defined as the likelihood of consumers to purchase certain products or services (Chandrashekar 2004, p. 59). Generally speaking, it is important to understand purchase intention due to its relevance in an actual purchase situation (Chang/Wiltd 1994, p. 20). Moreover, this variable is closely related with the price, quality perception and value perception that consumers have towards certain products (Zeithaml 1988, p. 2).

In previous literature considerable attention has been devoted on purchase intention as a predictor variable of subsequent purchase. This variable has shown to be very relevant for marketers because it is a key factor that predicts consumer behavior (Grewal/Krishan/Baker/Borin 1998, p. 338). As mentioned before, purchase intention is closely related to price. Thus, higher prices refer to consumers' monetary sacrifice to purchase products or services and therefore could lead them to lower purchase intention (Dodds/Monroe/Grewal 1991, p. 308). Moreover, the variable purchase intention is very relevant because it verifies final product evaluation of consumers. According to that, being aware of consumers' purchase intention is a key factor in estimating demand and designing optimal pricing strategies.

## **2.3 Theoretical background of math anxiety**

Math anxiety refers to the fear of people which have to do mental processing. Hence, math anxiety occurs as a feeling of tension when individuals are faced with arithmetical operations (Ashcraft 2002, p. 181). Math anxiety increases the probability to make errors in calculations and affects cognitive abilities to make numerical evaluation. Due to this reason, the importance to understand math anxiety in the context of price promotion is very crucial. In addition, math anxiety usually occurs when consumers face difficulties in computing the price due to complexity in the process of product evaluation (Suri/Monroe/Koc 2012, p. 271). People with high math anxiety have negative perception towards math which results in low ability to deal with math computations. Therefore, they tend to avoid numerical computation (Ashcraft 2002, pp. 181-182). Concerning numerical computations, consumers basically make evaluation when comparing the offered price promotion. Hence, they keep in mind the offered price promotion and afterwards compute the price and finally make a decision (Suri/Monroe/Koc 2012, p. 272).

Generally speaking, math anxiety is not only present to consumers who have lack of math ability, but also consumers who have good skills in math are faced with difficulties

while computing math tasks (Smith/Kirby 2009, p. 1363; Suri/Monroe/Koc 2012, p. 272).

### 3 Empirical background

#### 3.1 The influence of price promotion presentation on purchase intention

The main goal for retailers is to provide an adequate price promotion format in order to affect consumers' purchase intention (Gupta/Cooper 1992, p. 403). So far, the effect of price discounts on purchase intention is not clear yet.

Considerable body of literature has confirmed that price promotions shift consumers' purchase intention (Chen/Monroe/Lou 1998, p. 353; Inman/McAlister 1993, p. 340). Therefore, retailers use frequently price promotion in order to influence consumers' purchase intention (Burton/Lichtenstein/Biswas/Fraccastoro 1994, p. 131). In fact, during price promotions consumers will increase their intention to purchase the promoted products due to the price reduction (Inman/McAlister 1993, p. 340). The likelihood to purchase promoted products is higher for consumers who perceive savings as credible comparing with those who perceive savings as less credible, which have lower purchase intention.

Gedenk and Neslin (1999, p. 449) made a comparison between price promotion and nonprice promotion effect on purchase intention. According to their research, price promotions have stronger positive impact on purchase intention than non-price promotions. They suggest that price promotion increase purchase intention only in short term, but not in long term.

While designing discount, marketers can present a price promotion either in "amount-off" format or in "%-off" format. This leads to different value perception of consumers (Heath/Chatterjee/France 1995, p. 96).

Moreover, purchase intention is positively related with consumers' value perception (Dodds/Monroe/Grewal 1991, p. 308). Chandrashekar (2004, p. 63) suggested that price information (e.g. saving formats "%-off" vs. "amount-off", sale price, advertised reference price) effects purchase intention.

Basically, value perception is influenced by price promotion, which leads also to a positive influence on purchase intention (Grewal/Krishnan/Baker/Borin 1998, pp. 337338). Therefore, a higher perceived value leads to a higher purchase intention. In general, offering adequate price promotion will lead to a more positive effect on purchase intention (see table 1).

**Table 1.** The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions

Article	Objective	Key Findings
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Dhruv Grewal; R. Krishnan; Julie Baker; Norm Borin (1998)	Examines the impact of store name, brand names and price discounts on purchase intention and consumers' evaluations such as store image, brand quality perceptions, internal reference prices, and value perception.	It was found the perceived value positively influences consumers' purchase intention. Therefore, the better the perception of the value the more positively will be purchase intention.
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With regard to price level, Chen, Monroe and Lou (1998, p.366) found evidence that price reduction in “amount-off” format is better perceived for high price products over “%-off” format. Conversely, for low products the price reduction in “%-off” format is better perceived. Thus, the same price discount in the “amount-off” condition is better evaluated for high price products than for low price products. In addition, in the condition when price is displayed in “amount-off” saving format, a price reduction is evaluated as high, but very small when the price is presented in “%-off” format. On the other hand, for low price products, a price reduction is perceived small when is displayed in “amount-off” saving format and very large when presented in “%-off” format (Chen/Monroe/Lou 1998, p. 356). Therefore, the likelihood to purchase promoted products should be higher for consumers who perceive savings as credible comparing with those who perceive savings as less credible which have lower purchase intention. Hence, retailers cannot be sure which saving format “amount-off” or “%-off” lead to a stronger effect on purchase decision making (Chen/Monroe/Lou 1998, p. 357). Despite the fact that price presentation format (“amount-off” vs. “%-off”) with regard to product-price had a strong impact on consumers' perception of price promotion, the findings from Chen, Monroe and Lou (1998, p. 366) did not found a strong change on consumers' purchase intention. The table below shows a brief summary of price promotion messages on consumer's perception and purchase intention (see table 2).

**Table 2.** The effects of framing price promotion messages on consumers' perceptions and purchase intentions

Article	Objective	Key findings
Shih-Fen S. Chen; Kent B. Monroe; Yung-Chien Lou (1998)	Identifies if different implementations of price promotion (percentage vs. dollar term) affects consumers' perception and purchase intention.	In the case of high-price products retailers should use dollar formats over percent-age ones because the percentage of the discount is small. Contrary, in the case of low-price products they should use percentage formats in order to increase con-

		sumers' perception of savings.
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### 3.2 The influence of price promotion presentation on purchase intention considering math anxiety

The purpose of this relation is to understand whether consumers' math anxiety affects consumers' preference regarding price presentation format and purchase intention. The importance to understand the mental account process is necessary due to its relevance in consumer decision making (Bonini/Rumiati 2002, p. 205). Past research strongly supports the presence of numerical processing made by consumer in promotion stage. Despite this, math anxiety and price promotion literature still remain separate research areas and the interaction between these theories is not clear yet (Suri/Monroe/Koc 2012 p. 272). Therefore, in order to have a deeper insight how price presentation (“%-off” vs. “amount-off”) affect purchase intention with the interaction of the moderator role of math anxiety, the present research will explore this relationship.

Suri, Monroe and Koc (2012, p. 271) used the variable math anxiety in order to find out its impact on consumers' preference considering price promotion (see table 3). It was proved that mental accounting plays an important role in the framing effect (Rajendran/Tellis 1994, p. 23). Hence, in order to have a clear understanding how math anxiety affects consumers' preference for price presentation (“%-off” vs. “amountoff”), the analysis of the moderator role of this variable is very relevant.

**Table 3.** Math anxiety and its effects on consumers' preference for price promotion formats

Article	Objective	Key findings
Rajneesh Suri; Kent B. Monroe; Umit Koc (2012)	Examines whether consumers choice regarding price promotion format (“amount-off” vs. “%off”) is influenced from their math anxiety or ability to process numerical information.	It was confirmed that in the case of high motivation to process information consumers with high math anxiety prefer dollar-off formats over %-off formats but in the case of low motivation the preference for price presentation is not likely to occur for low math anxiety consumers.

## 4 Discussion

As mention before, previous researchers have analyzed the influence of price discounts on purchase intention and have found that consumers will increase their intention to purchase the promoted products due to the price reduction (e.g. Grewal/Krishnan/Baker/Borin 1998, p. 331; Chen/Monroe/Lou 1998, 353). In addition, many studies have examined the impact of price presentation (“%-off” vs. “amount-off”) on

consumers' price expectations and purchase intention (e.g. DelVecchio/Krishnan/Smith 2007, p. 160; Chandrashekar/Grewal 2006, p. 1065; Chen/Monroe/Lou 1998, p. 353).

Although, Chen, Monroe and Lou (1998, p. 353) examined the impact of saving format on purchase intention, considering the price level, the direct effect of saving formats on purchase intention without price level has not been analyzed yet. So far, there is lack of evidence that demonstrates the direct influence of price promotion on purchase intention (Chen/Monroe/Lou 1998, p. 353). In order to cover the gaps left by previous study, it is necessary to examine which price presentation format "amountoff" vs. "%-off" have a stronger influence on purchase intention without taking into account the price level.

Furthermore, the study of Suri, Monroe and Koc (2013, p. 279) demonstrated that consumers' preference for price presentation format ("%off" vs. "amount-off") is influenced by math anxiety. In fact, math anxiety leads consumer to be in tension while making arithmetical computation. Hence, they would choose the price presentation format which is easier to compute. If consumers have high motivation to process information and high math anxiety, they would choose "amount-off" instead of "%off" saving format because it requires less computation. In contrary, if consumers have low motivation to process information they will not be affected by math anxiety. Thus, consumers' preference would be the same regardless price presentation format (Suri/Monroe/Koc 2012, p. 280). In addition, no study has examined the relation between price presentation format and purchase intention considering the moderator role of math anxiety. Due to this reason, it is relevant and interesting to conduct a further research that analyze the relation between price presentation format ("%off" vs. "amount-off") and purchase intention considering the moderator role of math anxiety (low vs high), because it will extend and supplement previous studies on the subject of price promotion, by giving a theoretical contribution for the marketing perspective.

## **5 Conclusion**

Understanding the importance role of price promotion is not an easy task. Hence, analyzing all these results, it can be concluded that one of the major implications of this research is that practitioners should provide adequate price promotions to attract customers in the store. In addition, to understand the importance role of price promotion and to set the most adequate ways to provide price promotions regarding consumers' characteristics such as math anxiety. In general, an inappropriate presentation of price promotion leads to negative consumer evaluation and therefore to lower profit and sales. Due to this reason, retailers should deeply analyze consumers' needs and implement adequate promotion types in order to increase effectiveness in the marketplace.

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# **Building destination image through events: The perceptions of event managers towards the effects of events on city image: Case of Kosovo**

Arta Kuci<sup>1</sup>

<sup>1</sup>The University of Sheffield International Faculty, CITY College

**Abstract.** Nowadays, the environment is actively in move and competition is becoming more and more powerful. In order for cities to distinct from each other, it is of great importance to create a good image of it. Brand image is the general perception in consumers' mind that is built from many features and transmitting a brand's image to an aimed audience has extensively been considered as a crucial marketing activity. In this line, a powerful brand image is one that increases visitors' satisfactions, tourists' loyalty and positive publicity.

This paper studies the case of Kosovo, a country that it's known for its cultural, historical and natural resources. However, besides the presence of research in destination image, there is a gap in literature regarding the impacts of events in relation to building and empowering destination image. The present study aims to fill this gap by examining Kosovo's brand among event managers who organize various events in Kosovo. With the help of Kosovo's event managers, we undertook a qualitative study consisting of 15 interviews, from which we attempted to achieve the objectives of the study. In such manner this paper attempts to prove that successful events do play a crucial role in tourist's positive perceptions regarding the city image. Correspondingly, it aims to offer recommendations towards building positive impressions about city image.

Based on the results received, it has been concluded that events do affect positively the perceptions of tourists on the image of the city/country. Furthermore, the challenges that managers face while running an event have been identified. The present study in particular reveals the lack of financial support from the government, namely for infrastructure and marketing. As a sequence, like a domino effect - the lack of financial support weakens the promotion of events, which also weakens the interest of foreign tourists to visit the city/country.

**Keywords:** ~~Keywords:~~ Tourism, Brand Image, Destination Image, Impacts

## **1 Introduction**

Regions and cities are continuously branding and rebranding as a plan to gain a competitive position and stimulate visits, investments and economic benefits (Saunders and

Parkerson, 2005). The aim of cities to establish a special recognition and identification has gain a critical attention, which is fulfilled usually from beautiful attractions, various customs and cultures, social people, as well as from breathtaking landscapes.



According to Osder, (2015), having officially announced its freedom and independence on the seventeenth of February 2008, Kosovo is the second youngest country on the world. Not just as a nation, but its population is the youngest in Balkan as well, from which 28% are under the age of 15 year old and 50% under the age of 28 year old. Also, it is known to be as a place enriched with traditions and that the reminiscence of the battle and politic disagreements are still actual. In such manner as mentioned above, investigating the importance of events in establishing city image is of crucial matter, due to the advantages they can provide in respect of social, economic and political aspects, considering that they have the ability to attract local and foreign visitors, as well as stimulating future visits. And although there have been made some studies on the general impacts regarding the events (Wang, 2009), there is no connection or little study is made in literature to the effects of events in city branding, especially not for the case of Kosovo. According to Wahlisch and Xharra (2010), Kosovo has to overcome its unsecure reputation as a poor and post war country.

Thus this study aims to fulfill the following objectives:

- R01: to investigate event's managers/ organizers view on the impacts of events; R02: to investigate event's managers/ organizers perception about city image as a tourist destination;
- R03: to evaluate event's managers/ organizers' perceptions towards the experience and satisfaction of tourists achieved by visiting Kosovo and attending the events;
- R04: to identify the challenges faced by event's managers for creating events; R05: To examine the actions that event's managers take in order to strengthen city image;

## **2 Literature Review**

### **2.1 Tourism**

According to Poria et al. (2003), tourism can be estimated as a movement from a country to a destination and then going back to the home country. Nowadays, tourism is one of the biggest and quickest growing industries, identified with immanent requirement for continued variety of products and destinations offered (Daniloska et al. 2015) as well as one of the quickest sectors for economic development (McKercher, 1993). It is also responsible for providing benefits in cultural, social and environmental areas (Poon, 1993) and it has a fundamental position between economic expansion and success determinants in the world countries (Hashemabadi, 2015).

### **2.2 Events**

Cities are intensively adopting events as an approach of enhancing their image, of encouraging municipal development and attracting investments and tourists (Fredline et al. 2003). Not long ago, events and festivals have been considered as to be as one of the quickest developing tourism adventures and experiences, that have made places to instantly assimilate all their strategies and objectives to present demands. Events are a crucial stimulator of the tourism, which figure positively in the progress and marketing

aims of the majority of destinations (Shen, 2013) and are organized for region image establishment, brand improvement and positioning of the objectives. (Wang, 2009). Nevertheless, authors have divided their opinion differently in the respect of the notion of events. Some authors see events as something particular that offer an experience above the one they experience in their daily life (Morgeson et al, 2015)) as well as global gatherings of restricted periods, which are organized for the reason of sharing information among connected actors and give a meaning collectively (Dobusch, 2012). On the other hand, other authors distinguish events as a service of tourism sector, where institutions, individuals, or even private organizations collaborate between each other in the purpose of establishing a special event, to provide an experience with an unforgettable result (Hoffman & Ocasio, 2001).

At an important matter for all the advantages and objectives to be reached, it is requiring a successful organization of running an event. According to Shone and Parry, (2001) to formulate a good event, it is essential to arrange it on time, to hold good interactions between all actors that are engaged in the event and with the community regarding the development of the festival. On the other hand, Ambrosio (2011), believes that for a specific event to reach its aims, it is of crucial matter to understand a way to lower possible issues and to respect the day-to-day actions of the hosting community or else no pre-objective will be achieved.

After continuous research, Nobili (2005), found out that those events which demonstrate efficiency in branding a destination and improving its image usually have stability, local support, skillful organization, harmony and agreement with the destination, research into people's impression of the event and media presentation. Supporting this theory, Neumann and Mathes (1987), state that events, which attract media's awareness to the event country, provide a chance for the city to communicate to an accessible audience through different channels of media. However, David, (2009) reveals that events can generate negative impacts as well, such as: damaging the environment, traffic disturbance, noise and pollution. Nonetheless, according to Conrad et al. (1999), they are the best option for a city or region to attract visitors' awareness to particular community attractions, as well as offering an amazing experience.

Events seem to be very fun dealing with, but unfortunately, it takes a lot of effort when organizing them. Byon and Zhang (2010) support this belief by arguing that in order to organize an event successfully, it is of great matter to plan the time needed to establish and operate an event carefully, as well as to keep connections with various organizations that are willing to contribute in the event and with the hosting city about the process of the event. In the contrary, Chi and Qu (2008) consider sponsorship, the staff and volunteers, artists and their performance as well as the security and the ornament of the whole staging as the most important factors in achieving a successful event management. As for the case of Kosovo, events and festivals are something that residents enjoy it to the fullest. Even though Kosovo is known as possessing a small territorial area, it generates plenty events and festivals. The variety of events helps residents with different characters and preferences to get together in a small country like Kosovo. The people consider festivals and events as a good thing to distinguish a usual day from the daily happenings. One thing that makes an event more special in Kosovo is that they are organized in that way that fit with the preferences of not only the youth but the

adults as well, since the adults are also people who like entertainment and in a way try "to stay young" (Mejtim, 2015). In conclusion, there have been many researches on the impacts that an event can generate, starting from economic, environmental and socio-cultural (Wang, 2009). However, there is no connection to the effects on city branding.

### 2.3 Brand image

Transmitting a brand's image to an aimed audience has extensively been considered as a crucial marketing activity. Nowadays communities are attempting to raise interest of many tourists because of the great rivalry in today's environment. Cities are being considered as compound products that are in need to be traded and publicized among advanced strategies of marketing in order to differ from others. Furthermore, selecting a place for holidays has become more than just a destination for many visitors, namely a determinant of visitors' lifestyle, since they have engaged values that are sentimentally attractive to foreigners. Accordingly, Thompson et al, (2006) and Roth, (1995), believe that brand image is an essential determinant for visitors when comes to choosing a final place, which guarantees tourists quality of the occasion. Thus, Chematony and McDonald (1992), state that managers who are responsible for branding are under a great pressure to provide effective brands, which are required to make remarkable changes. Strengthening this believe, when a number of places are in rivalry, what would make customer purchase and return is a strong and understanding brand image, which in turn would make a destination gain a unique position (Westerbeek et al (2012). As for its concept differences still exist. While Kivetz and Simonson, (2002) figure that brand image comprises of a combination of the views, behaviors and emotions that are connected to it, for (Salciuviene,2007) brand image reflects or reveals itself completely by including advantages and values that visitors predict and connect with brand preferences. Nevertheless, according to Gomez (2012) the definition of brand image from the American Marketing Associations is considered to be as the most communicative concept, which explains brand image as a picture and estimation that tourists have over a particular product, organization business and community. Creating brand image can happen through different aspects; anyway, the advantage offered to consumers by the product is assessed mainly. Actually, the advantage provided by the product is manifested on the brand image in the minds of visitors. Thus, through developing brand image, which fits with the expectations of the tourists, a city can boost the seduction of products to customers and enhance the appearance of a city (Salciuviene et al.,2007). Moreover, Morgan et al (2002) argue that it is of important matter to continuously monitor brand image and its progress, for it may impact the community spirit, collaboration among shareholders as well as the dignity.

A proper communicated image should assist on creating a brand's position, protect the brand from rivalry and hence, improve the brand's market performance (Bernald et al,1996). The struggle for consumers in choosing a destination is not only about economic determinants, such as prices but rather over minds and hearts, with personal interests as main determinants in choosing a destination (Gruescu et al,2008). Naidoo et al. (2012) considers three main reasons for why brand image is important. Firstly, brand image affects the visitors' preferences for choosing a holiday destination. It portrays

visitors' mental view created by a number of features that determine the destination in its different aspects. Secondly, brand image affects decisions behaviors toward future purchases, including assessment, such as satisfaction, and upcoming behavioral aims. Thirdly, a powerful brand image is a necessary thing in order to establish strong position for the destination, thus to attract possible visitors. Simmons and Becker, (2006) suggest that in order to create connection between customers and brand, organizations must communicate the character of the brand. In this line, researchers pay a close attention into numerous determinants of establishing a strong and unique brand. Although for Tharmi and Senthilnathan (2011) the reputation, the venue and the context are the principal determinants on establishing a powerful brand, Farquhar et al. (1990) lists as more major elements the promotional messages, info about price and the experience gained. In addition, Morgan et al. (2002) claims that to establish a strong brand image it is not enough to use just the advertising activities, it also needs the support of collective media, customer's impressions, direct marketing and the help of events.

#### **2.4 Destination Image**

Since the image impacts visitors' impression, it is crucial to realize what impacts image creation in the visitor's mind (Kasim et al. 2014). Ping Lun (2015) explains destination as the entirety of all impressions, beliefs, perceptions and ideas that people embrace of a place. Furthermore, Ping Lun (2015) claims that image has a positive impact on quality. Destination image also applies as a positive impact on satisfaction and perceived quality due to the fact that it creates visitors' pre - traveling expectations. Ilban (2008) supports this theory by defining destination branding as the development of an emotional connection with the visitors. Years later, Avram et al. (2014); Som et al (2011) strengthen this believe by arguing that the visitors' return to a destination mainly relies on the presuppositions one had of the destination, on the predicted images of a place and on the personal experience in that place. They also created a model in order to determine the effects of destination image, of perceived value, novelty in tourism, and satisfaction on the purpose to return. The model describes that a growth in the level of quality will have as outcome visitor satisfaction and will generate a positive place image on the market, creating as a result powerful impact on the return levels of the visit, which in turn will provide economic benefits in tourism industry. Being affected by an emotional and mental process, the destination image is built through various info elements such as, media, membership, reference gatherings etc. Hence, each person can create an image in their mind, even though they never visited that destination. This means that a destination's image can be established on social, economic, political as well as historical data, that will structure the image which a tourist had (Echtner & Richie, 1991). Furthermore, Olimpia (2008) argues that a country may have various images, but they must be compatible and that the image a country will gain relies on the context and audience. Branding a city can occur from a number of elements and cooperation, such as the geographical aspect of a place, visitor's attractions, natural sources, national products, people, traditions, race, history, ethnic groups etc. In addition, Olimpia (2008) suggests efficient steps in order to find an appropriate image for a country, such as: identifying the advantageous characteristics for a country, their

allotment on fields, categorizing and assessing them regarding to the importance they provide and analyzing the visitors' view concerning the level to which the country encounters these features. The features' framing fields can be emotional, functional, conditional and epistemic fields. A great number of countries tend to give their maximum to create a strong brand, for it is considered from many cities as to be a crucial instrument for gaining a position into the destinations rivalry; As for the visitors the creation of a destination's image doesn't happen during the visit, rather before going to the destinations and it is of important matter to build a good one since it influences into boosting and restoring memories of the future trips. Erfurt and Johnsen (2003) come and confirm this view through stating that different people have special image for a particular destination, consisting of their own flashbacks-memories, accompaniment as well as their own perception of a specific place. Nevertheless, Avraham and Ketter (2013) argue that if cities have any sign of avoiding the management of destination image, it may generate great issues in building a competitive position above other places. In 2007, Tasci made a research where it was concluded that race, a past experience to the destination as well as the age are of great importance for the creation of destination image in the visitors' view. On the other hand, for Walmsley and Young (1998) the education level and the need for travel create emotions and feelings. In relation to this theory, in 2007 Govers et al argued that the character of a visitor takes an important role in deciding which place to choose as a destination (mountain, sea, etc). Meanwhile, demographic factors as well play a big part in affecting the creation of a tourist's image for a destination (Beerli (2004). Nowadays, some authors propose that psychological elements like as: cultural advantages as well as the motivation of a visitor to travel have a great impact on building an image of a place that tourists haven't visited yet. In order for destinations to differ from other destinations and to gain loyalty, branding can be the only way to achieve this. Thus, it is of great importance to develop a unique destination brand in order to affect the satisfaction of visitors and stimulating further purchases. (Kozak,2005). Farias et al (2013) believes that destination images are created by three distinct but correlative elements in a hierarchic way: cognitive, affective and conative variables. The cognitive variable includes an assessment of the understanding of the country in an intellectual way. It is necessary to show that because of the incapacity to pretest the visit offer and touristic images will usually be relied more on impressions than reality. On the other hand, the affective component encourages the selection of a destination and the conative element refers to the individual attitude. According to Ritchie and Ritchie (1998), in tourism industry, a destination should provide strong quality services in order for it to gain a competitive position. Simultaneously, a destination should provide a unique experience or product for visitors to turn back or at least share the positive experience with others. At this time the principal causes for destination branding are to generate a preferable image that motivates tourists in visiting it and to position the destination in order for tourists to choose it before other destinations as a means of spending more money for it, thus improving the community's standard of life (Park, 2006). On the other hand, for Dinnie et al. (2010) the main reasons for branding are to increase investment, expand sales, stimulate tourism and attract new locals. Pars and Gulsel (2011, state that the destination image includes three elements: General image, brand identity and destination brand. For them, destination

image is related to the perception of tourists. In this term, the most important issues that visitors focus while the decision-making process are the lifestyle and values of the destination. In order to make a destination attractive it is necessary to offer some features that other destinations do not provide, as well as revealing social values. As for Kay et al. (2010), creating a powerful destination image varies also on the kind of events that occur in that country, as for instance, the attendance of sport teams, commercials effect, traditional attraction or unique festivals. The formation of destination image contains two ends data communication: the destination and the acceptor. Thus, the formulation of image has the offering side such as the destination, for instance marketing activities, and a request side, the acceptor. The same author further suggests taking into consideration the fact that these two information communications are not always the same and it is important to understand that the communication of destination message it is not the only way to create image, but also through personal experience, such as it happens when going personally to a city. Furthermore, creating an image can also happen through publicity that media does in positive or negative way for a country, without having to involve promotional activities.

In 1972 Gunn has classified two categories of the tourist image regarding a destination, created by the type of data transferred to the visitor. The Organic image, such as: the entire data and info that are communicated out of intention or "accidentally" through agents of tourism destination. This kind of info can be communicated from books (either historical or geographical books), radio, TV, magazines, newspapers as well as from residents of the visitor destination. Induced / Convinced image, such as: the image which is created through advertisings and promotions as well as the one transmitted by the tourism institutions or organizations within a country. Regarding to this theory it is naturally believed that group members or opinion speakers do have a strong impact on the viewpoints and impressions visitors possess for a specific place. Years later Tocquer and Zins, (2004) strengthen this belief by examining the perceptual impacts on visitors in respect of a specific place, and through this study they suggested the classification of images on four levels of evolution progress: Unrealistic and unclear image - stems through word of mouth, advertisement and education. This stage is developed before the visitor makes the trip. In this context, tourists consider a holiday trip as a healthy thing. Distortion of the image - at this level, the visitor has made a choice to make a trip, selecting the place, time planning and the kind of visiting product. The image of the trip changes and becomes more defined during this stage of development. This image then gets way clearer when the destination organizations and planning have been finished. Enhanced image - at this category of development, third stage, the visitor experience the destination by their self. When the contact of the destination and tourist is direct, the image will be enhanced by removing the uncertain and incorrect features and reinforcing the features that confirm to be real. Resulting image - The last stage of development, the fourth one, has to do with the latest flashback of the trip, which can guide to remorse, imagination or regrets. Consequently, a group of fresh images will be produced, which will impact and motivate next selection about that destination. Lopez (2011) aproposed that for a better beneficial advertisement of a touristic place, communicated information and messages have to be used in the informal stage of the image and the convincing information might be suitable for the formal stage of the image.

While in the primary phase of the image, the author comes to a conclusion that information that remind visitors of their experience are way more profitable. In short words, the destination image has become one of the best and most crucial features of a tourism product or place and such has taken a critical role on the breakdown or success of the management of tourism. After examining the chosen literature in respect of the destination image, it is observed that destination image as a notion is thoroughly studied. Nonetheless, the connection between events and destination image can be quiet testing, since there is a lack of study for this relationship.

## **2.5 Impacts of events**

In these last decades, events and festivals have gain the power to bring different cultures in one place, to share social and cultural experiences, new employment possibilities as well as investments and partnerships. Thus, it is fundamental for the managers and organizers of events to consider all the possible perspectives that could affect the community where the event will take place such as economic, environmental, socio cultural and political impacts. (Schulenkorf,2012). In addition, the events have to be perceived not just as a point of amusement for the visitors, but also as a way to satisfy the locals and promote customs and traditions (Hertanu, 2012). Further, Jones (2001) claims that some of the usual impacts of events can be: social impacts on locals, additional expenditure and income production, infrastructure inheritance, publicity and visit repetition. On the other hand, Daniels et al (2003) argues that even though events are hosted due to the facts that they offer a community entertainment and boost local pride, the most crucial reason is the economic one. Wang (2009) supports this belief by explaining that events have principal economic functions like as stimulating interest for investment, generating employment, advancing standard of living and are seen as to cause wealth development of tourism. Considering all these positive effects there is no contradiction that successful events improve the quality of the residents' life by a higher level. Strengthening this theory, Hertanu et al (2012) states that events can impact the community economy positively and negatively. In a positive way, it can boost incomes by providing local economy, visitors and attendants in events by spending money for tickets, accommodation, souvenirs, meals, etc. It also increases employment in various fields, specifically in construction, tourism, infrastructure, travel and so on. On the other hand, it has negative effects as well like as, the costs needed for the event, whereas organizers of events are local authorities: schools, government, universities municipalities, and prefectures. On the other hand, Getz (1997) and Ritchie (1984) state that events have more important impacts than economic ones, such as increasing local spirit and pride, reinforcing values and traditions, application of new social forms or cultural patterns through manifestation at the event, marketing advantages such as branding, intercultural and community group activities. In order to improve these impacts it is needed to enhance the event, to offer quality of services, to increase the amusement of the attendants and to decrease costs (Popescu et al,2012).It is reported that events contribute to the transformation of the community and to the success of the destination, since it creates job opportunities (Prentice & Andersen, 2003), stimulates the development of social infrastructure and contributes to natives learning through knowledge

regarding to local pride, and identity (Bachleitner&Zin,1992). In this context, Wang (2009) claims that events add value to the quality of life by empowering interactions among various cities even distinct countries, improving recognition of diverse identities and cultures, as well as behaving as a source of local pride. These impacts, even though important are in lack of attention. Apart from financial effects that events bring on communities, countries or regions recently cultural and social effects have taken a great attention as well.

As reported by Roberson and Knight (2007) socio -cultural effects have the biggest impact on the house country. In spite of their complicate and intricate character when examining, since they crave for detailed data selection, analyzers have determined a number of claims for why sociocultural impact have to be evaluated. While Chalip et al. (2003) report that events are of critical mater to locals for refreshing customs, generating region dignity, boost cultural aspects, projecting the traditions through events and education, Hallman and Breuer (2010) argue that socio-cultural effects can enhance recognition, improve attendance of people in a celebration, through expanding their boundaries and revealing them with fresh ideas. , Schulenkorf et al (2012) states that other crucial impacts have to do with universal learning, the ability to monitor region development, improvement of behaviors, values and also bringing a community along and offering a friendly or family atmosphere. Besides, the author also state that festivals and events may improve personal and mutual capabilities, advertise and increase social recognition.

### **3 Methodology**

While the last chapters embraced the conjectural and academic parts of this paper, the actual section (chapter) has in center of attention the methodology used for this study. The actual chapter involves the research design, the description of the sample and the data collection analysis.

#### **3.1 Research Design**

According to Teddie and Yu (2007); Babbie (2013) a research can be applied by three methodologies: qualitative, quantitative and mix methodologies in order to cover a research question and objectives. The purpose of the three methodologies is to describe and justify specific situations. According to Teddie and Yu (2007), in quantitative methods the researcher describes the connection among one variable to another and it is largely applied to interpret phenomena across the application of statistical methods. Meanwhile, in qualitative methods the researcher tries to examine participant's attitude and impressions in respect of a specific matter or subject. The three research methods have their advantages and disadvantage. However, considering that the purpose of this study is to understand theperceptions of event managers towards the impact of events in building cit image, it is supposed that qualitative research method is the most appropriate for this research. It was decided that the instrument used for this study will be interviews.



### 3.2 Interviews

According to Gill et al. (2008), interviews are a type of discussions with a purpose and currently interviews done for research aims are commonly being used. There are three important types of interviews:

- Structured interviews
- Semi-structured interviews
- Unstructured interviews. (McLeod, 2014).

The structured interviews are called formal interviews as well. The questions are made in a systematized structure and the interviewer will not vary from the interview scheme above the answers collected, since they are not flexible (McLeod, 2014). On the other hand, unstructured interviews are more likely informal conversations where a scheme or program of the questions might not be used or even if they are used, some questions can be forgotten or added depending on the development of the interview (Saunders, et al., 2000). With regards of this study the semi – structured interviews were applied. Semi-structured interviews are well matched for the investigation of the attitudes and point of views of respondents in respect of complicated and sometimes vulnerable issues and enable exploration for additional explanation of answers (Barriball & While, 1994). It is used in qualitative research, not just to establish an understanding in regards of ‘how’ and ‘what’ but as well as to investigate the ‘why’ (Saunders, et al. 2000). Furthermore, Interviews have their strengths and weakness as well. The interviewer will receive transparent feedback; verbal and nonverbal prompts will inspire additional clarifications of the answer; since it allows respondents to express in their own words they provide richer data and details; establishing familiar relationship and interactions with the respondent, which will make them feel more relaxed; topics can be explained in depth through the application of probes; they are categorized with flexibility regarding the adoption to specific individuals and situations and clarifying question which will lead into boosting the preciosity of the information gathered. On the contrary, they can be time -consuming, due to the preparation, attending the interview and analysis; Interviewers errors - like as the tone of voice, the way a questions might be asked, doing mistakes while noting ; difficulties in analyzing since interviews provide a big amount of data in a short time; and they are costly, including costs of training, attending, analyzing and programming (Newton, 2010). On the contrary, if using the structured interview, where the respondents have to be answered with options like ‘Yes’ or ‘No’, the information needed would not be found. Likewise using unstructured interviews would be challenging to judge and determine particular information that is required for this research. Lastly, due to the low probability of getting respond by the focused group, it was decided to eliminate the method of questionnaires. The interview will consist of thirteen (13) questions, which require proximately fifty (50) minutes of conversation. This method nowadays is internationally expanded and used as it offers the potential to the researcher to recognize and select respondents with comprehensive data that are connected with the study being analyzed (Gill et al.2008). As stated by Burkard et al. (2009), this technique asks researchers to become capable to develop safety sensation to the respondents for them to be more relieved while answering and in this way, it

provides the researcher the competence to have access into the participants' comprehension. The 13 questions of the interview were created to embrace a number of important parts of the impacts of events in the city image of Kosovo and are in comfort with the aims of this study.

## **4 CONCLUSION**

As we mentioned above the main purpose of this study was to examine the perception of event managers towards the effects of events on city image". The aim of this study was not only to focus on manager's views towards the impacts of events on building destination image for Kosovo but also their attempting to work towards this scope. The examination made for this research has brought us to the conclusion that the impacts that can come from an event are of crucial matter be that on the country, its community or in its image and that the managers of event are in acknowledge with the positive impacts from events such as economic ones, social, environmental and political ones (especially in the image of a country). Moreover, they see Kosovo as a future tourist destination as it possesses a number of natural resources, culture heritage and unique tradition, providing its country a great potential for developing tourism and automaticity increase Kosovo's income. On the other hand, through analyzing and exploring the answers wenoticed some worries from managers' views in respect of the infrastructure and the space the events take place, claiming that the infrastructure where event perform are weak and these are the main complains that tourists have based on mangers opinion and that financial support should be made in this aspect. Still respondents have shown further mutual opinion that the residents of Kosovo are very welcoming and friendly people with very positive attitudes making tourist want to come back to this friendly and warmly destination. Furthermore, mangers have been complaining about the lack of sponsorship support, particularly for governments who have little understanding of the benefits/positive impacts of events on a community, namely on country image. Thus, due to the lack of support the promotion is weak, meaning that it leads to less attention of tourists even though managers indeed use social media for promoting. Managers advice for more focus on the strategies/laws of support for events to governments, as they see the little support from government as one of the biggest challenges to organize and run an event. In conclusion, even though Kosovo has potential to become a tourist destination because of its assets: culture heritage, traditions, natural resources and considering the fact that some event held successfully helped Kosovo in many aspects including sharing recognition for this destination, still it has many space for enhancement of the organization and performance of events In order for events to share and impact on city image in more successful ways.

### **4.1 Recommendations**

1. Enhance infrastructure

Since infrastructure was one of the biggest challenges for event managers, it can be recommended to improve the weak infrastructure, such as the objects and roads in order to make the relation between different countries easier and more favorable.

## 2. Promotion of events

Show from the answers, events target young and middle age, making it easier for them to promote since these two targets can be reached through social media as well. It is of crucial suggestion to make investments on promotion of events in global online newspaper and websites as well as sponsor posts on social media that can reach thousands of people worldwide. But for this to happen, except that is required financial help also managers should hire a great designer to make the video posts as much interesting as possible.

## 3. Tour operator should increase their activities.

Since Kosovo is a place with low prices and suitable for low budget as well, tour operators should work more on offering interesting and low package prices for tourists and managers should cooperate with them. When posting and promoting they should also give recommendations on their social media for the offers that travel agencies give while an event is taking place.

## 4. Establish a project for support.

When managers plan events, they should provide to sponsors further detailed documents of the benefits of Kosovo and its community. Government should establish budget for events which have as objective and target tourists in order for them to gain the benefits.

### 4.2 Further research

For an event to produce the positive impacts that we have discussed in this paper, a number of factors should be combined such as: the assistance of the right authorities, promotion, tour operators, accommodation partners and so on. When tourists come from their countries in Kosovo, they stay there at least 2 days and together with the experience of event, their stay and satisfaction depends from their accommodation as well. Thus if further study would take place, the focus can be on other tourism categories as like: hoteliers and tour operators. And knowing that Kosovo's best hotel potential is in Prizren, namely in Brezovica Mountains which is currently being improved, one can focus on this sample.

# Examining the relationship between Motivation and Job Satisfaction in Greek companies

Erza Gashi<sup>1</sup>, Savvas Saropoulos<sup>1</sup>, Anastasios Diamantidis<sup>1</sup>

<sup>1</sup>Business Administration and Economics Department of The University of Sheffield International Faculty, CITY College 3, Leontos Sofou Street, 546 26 Thessaloniki, Greece.

**Abstract.** The application of motivation techniques into business, may be considered as a powerful tool for the Human Resources Managers. For that reason, is focused to investigate relationship between the motivation factors (Fiscal, Non fiscal) and employees' job satisfaction. The research is based on a questionnaire distributed among 137 employees in Greek companies where the participants had to respond to questions on motivation factors and job satisfaction. The results reveal that there is a statistically significant relation between the examined motivation factors and job satisfaction, indicating that probably it is necessary for companies to develop a specific motivational strategy, adapting to the specific needs of their employees, in order to improve their level of motivation.

**Keywords:** Employee Motivation, Job Satisfaction, Quantitative Approach.

## 1 Introduction

There is a certain complexity in the concept of motivation and its effects to the individual but also to the group. Motivational techniques are applied in any part of human life, however and during the past decades they are more and more applied in the workplace in an effort to encourage employees to work harder and in an enthusiastic way. For that reason, job satisfaction was widely studied by scientists of the human resources management field [1] in an effort to determine the interrelation of the quality of work in relation with the quality of benefits offered to the employees. This is because experts assumed that it is easier for humans, through motivation, to accomplish their goals in a more pleasant and efficient way. In 1911 first Taylor conducted a study in an effort to explore employee satisfaction with Mayo Hawthorne studies following in 1924 proving that it is of the utmost importance to use motivation techniques in order to boost efficient work. Since then there have been numerous theories, in an effort to provide explanation on the way that job satisfaction is caused and the impact that it has to the employee [2]. The purpose of this assignment is to discuss thoroughly the existing literature on employee motivation techniques, but also job satisfaction monitoring. Initially this assignment refers to the definitions and meaning of motivation and job satisfaction, to be followed by the analysis of the Maslow's Hierarchy of Needs, Theory Y and Herzberg Theory and extrinsic and intrinsic motivation strategies, covering existing theory based on the three major management schools of thought.

## 2 Literature Review

The motivation techniques are designed to motivate, inspire, and attract the employees to increase their performance at work, still in a cost effective manner [3]. Thus the managers face the challenge to find cheap ways to keep employees motivated, without increasing their salaries. It is paramount for the managers to make the employees to feel important and secured. It is also an effective way in equalizing the payroll system of the company. Thus there are two ways that a company may use to motivate employees. The first include fiscal rewards, meaning the money that the employee is receiving. This reward is categorized by Herzberg as a hygiene factor in his two-factor Theory.

- Fiscal motivation

Of course the amount of the fiscal rewards should be determined by factors as the total amount of hours worked, overall performance and quality of work leading to job satisfaction, however, if the fiscal reward fails to meet the employee's expectations then, it lead to job dissatisfaction [4]. Being an extrinsic motivation factor, it is implied that the satisfaction has not its source into work but it ensures the work quality, supporting the motivation of the employee [5]. A study conducted by [6] showed that money may not be always considered as a motivation factor.

- Non-Fiscal

The non-fiscal motivation technique however, is based on the intrinsic motivation principles. As such the motivation is based upon feelings, as that of success, or selffulfilment. Non-fiscal rewards are relatively cheap for the company, including, free lunch or beverages, free tickets, flexible working hours, group insurance scheme, company doctor, extra vacation, appreciation etc [7]. Therefore, managers have available mainly two sets of motivation techniques categorised into fiscal and nonfiscal. There is a number of experts that believe that each technique has a different impact to the employees, yet there is also another segment that does not consider money as a motivation technique and believe that it shouldn't be used as such.

Emphasising on the Individual basic need fulfilment, Maslow's Hierarchy of Needs, is based on the constant effort of the individual to satisfy needs as safety, communication, self-esteem and actualisation. This is probably one of the most widely known and used motivational theories, suggesting that human needs are characterised in five categories [8] and if the individual manages to satisfy the first level, then passes to a next level moving upwards. Maslow's hierarchy of needs is based on the concept that humans are "wanting beings" meaning that we are constantly in search for something more, and includes the following levels;

- Physiological Needs, e.g. food, water, home.
- Security; after fulfilling the basic needs for his survival, the person, moves on trying to ensure his and his family's security and protection. There is however, another kind of security, including job security, which will ensure the individual that he will sustainably maintain the first level's fulfilment.

- Love and Belonging; this level includes the feelings that the individual experiences when he feels that he is needed or appreciated within his social circle. This may come up from a good friendship etc.
- Esteem; this level includes both the esteem that the individual may feel for oneself, but also the esteem that he may receive in terms of appreciation from others. Achieving satisfaction of this need leads the individual to the next level.
- Self-actualization; which implies that the individual has realised his potential, strengths and weaknesses.

Despite the fact that this is a widely recognised and practiced motivational theory, some researchers as [9] and [10] claim that there is a flaw in the theory since not all people believe that all levels should be completed prior reaching the next. There are some people, as in the case of contemporary Greek employees, that may prefer to achieve job security, even though they don't manage to fulfil the first level of physiological needs.

Maslow's hierarchy of needs to differ from the rest of the motivational theories, demanding insight, creativity and imagination from the part of the managers. According to [11], conducted a case study, examining the reaction of a company in New Zealand, wanting to deal with the aftermath of a natural disaster, without compromising the well-being of both its employees and clients. This case illustrates that the key to an effective motivational theory decision making policy, is adaptability. [12], conducted a research in an equally stress environment, examining the motivation strategies and their application in correctional facilities. [13] in an effort to find differences in a diverse working environment and evaluate the flaws of Maslow's hierarchy of needs within a multinational environment, monitored the overall satisfaction of employees in a multinational company, underlying the necessity for human resources managers to consider various factors prior the creation of the final motivational technique strategy. Similarly, studying the employees of a specific ethnic background one should consider their specific socio-cultural practices and habits, in the case of the Greek market, one should forget national and religious celebrations but also the present stress caused by the financial crisis.

Created by Douglas McGregor, back in 1960, Theory Y mainly assumes that humans possess a hereditary need to work. Thus idleness is un-natural for a human and therefore humans would work as hard as they can to overcome problems, find solutions to workrelated problems and achieve the maximum productivity possible. Thus if a company motivates its employees then they all begin from an equal basis trying even harder to produce in an efficient way [14]. The theory utilises both fiscal and non-fiscal rewards in order to motivate its employees and manly praises, efficient performance, excellence, innovative thinking, encouraging competitiveness to reach efficiency in a sustainable and innovative way [15].

Similarly, to Maslow's Hierarchy of needs, Herzberg's Motivation Theory has only two satisfaction factors and for that reason it is also known as the "two-factor-theory". Having as his basis Herzberg conducted a study on job satisfaction back in 1950 in Pittsburgh. The initial hypothesis supported that job satisfaction is caused by things totally opposite than those which cause job dissatisfaction. The first factor includes the

“Motivators”, including career advancement, recognition, achievement etc The other factor is “Hygiene” that include, personal life, interpersonal relations etc [16]. As such, motivators are the factors causing satisfaction having their source intrinsic feelings. The absence of motivators does not affect the motivation levels, however their presence implies satisfaction growth [17]. Hygiene factors on the other side, do not cause satisfaction, still their absence results to job dissatisfaction. Still, there were so many factors to be considered that it is impossible to include all of them within a single test, thus the evaluation is impossible. The lack of a “one test fits all” patten demands that the human resources managers will proceed to specific adjustments in order to cover all the employee cases [18]. Overall Herzberg’s motivation theory claims that employees may be dissatisfied about several things, including security, status, salary etc however, satisfaction is not guaranteed.

### **3 Research methodology**

The main goal of this paper is to explore the relationships between motivation and job satisfaction. For that reason, a questionnaire was constructed to measure the researched factors, as well as the demographic profile of the sample. The questionnaire included questions that included the gender, age, educational level, work experience and position but also industry that the company was occupying. The purpose for that was to be able also to examine the answers considering the demographic information provided. Totally for the 208 distributed questionnaires, 144 were received and form them 137 were valid.

The participants were asked to rank from one (strongly disagree) to five (strongly agree) five sets of questions, focusing on Fiscal Motivation [19]; [20]; [11]; [21]. Non-fiscal motivation [22], [23], and Job satisfaction [1], [5]. The reliability statistical analysis showed that Cronbach alpha scores were the following: Fiscal Motivation ( $\alpha=0,686$ ), Non-fiscal motivation ( $\alpha=0,691$ ) and Job satisfaction ( $\alpha=0,726$ ), and as it can be seen they are accepted since they are above the threshold of 0.6 [24].

### **4 Findings**

In this section the basic demographics of the sample are presented, analyzed and commented. The demographics, analyzed here, are represented by nominal variables and thus the frequency distribution is used in order to organize and interpret them. General Statistics - the general statistics and depicts the main nominal variables of our analysis. In addition, these shows the total sample which is  $N=137$ .

Gender - Based on the data 51,8% are men and 48,2% are women. In order to present the gender of our sample in numbers, observed at the frequency column. Based on this column, it is concluded that from the total sample  $N=137$ , 71 are men and 66 are women. Age - The age of the participants is considered as nominal variable due to the way that is chosen to measure it. 16,1% are <25 years old, 27% of them belong to the age group 26-34, 21,9% of them belong to the age group 35-44, while 35% of them are 45<.

Educational Level - More specifically, 38% of the participants have either a pre High Scholl Qualification or no qualification at all. 48,9% of the participants have a Bachelor degree. 9,5% of them have a Master degree and 3,6 % of them have a PhD degree.

Job position - Based on the data 137 are employees.

Industry - . The majority of the sample (81%) declared that their company operates in the servicing industry, 17,5% of the sample declared that their company operates in the retailing industry while 1,5% of the sample declared that their company operates in manufacturing industry.

Competitive position - The majority of the sample declared that their company has a competitive position in the market, 12,4% of them declared that their company is a small player. 1,5% of them declared that their company is a big player while 7,3 of them declared that their company is a leader in the industry.

Work Experience - The majority of the employees (53,3%) have 4- 7 years of working experience. The 22,6% have 8-10 years of working experience, 16,1% have less than one year of working experience, while the 3,6% have 1-3 years of working experience in their company. Lastly, 4,4% have more than ten years working experience. Due to the fact that the variable "work experience" is an ordered level nominal variable, it is possible to count the main indicators of central tendency and dispersion.

Indicators of central tendency and dispersion for the variable "work experience" - it is contemplated that the mean of the variable "work experience" is 2, 9. This means that the average of the work experience in years is almost 3 years. The median of the variable is 3. This means that the 50% of cases take lower values compared to median, while the other 50% of cases take higher values compared to median. The mode of the variable is 3. This means that 3 is the number that repeated most often in a sequence of number the dataset. The standard deviation of the participants' work experience" is low compared to the mean and thus it can be concluded that the distribution values are close to the mean.

Indicators of central tendency and dispersion for the variable "work experience" - More specifically, it is contemplated the majority of employees' (77, 4%) work in companies with 1-25 employees. 12, 4% of them work in companies with 26-49 employees while the 10, 2% of them work in companies with 50+ employees. It can be concluded that the majority of the companies of our sample are small-medium companies.

Market Share - market share" based on the data 13% of the participants declared that their company has 20% market share, 46,7% declared that their company has 30% market share, 36,5% declared that their company has 40% market share, while 5% of the sample declared that their company has 4% market share.

Statistical correlation is measured by coefficient (r). This coefficient takes a wide range of numerical values from +1.0 to -1.0 and provide the researcher with important information about the strength of relationship between two numerical variables. We use this statistical analysis in order to test correlations between the variables of the current research. Due to the fact that the main variables of the research are Linkert scales, we transform them into numerical variables by computing their total mean. By doing this, we create new variables that can be used as numerical in SPSS [25]. Generally, when the Pearson coefficient is  $> 0$ , we have a positive relationship between the variables.



When  $r < 0$  this means that we have a negative correlation between our variables. Lastly, coefficient  $r = 0$  shows that there is no relationship between the two variables [26].

Pearson coefficient for the variables fiscal motivation and satisfaction. The following hypothesis was tested:

- H0: Fiscal motivation doesn't influence satisfaction. There is no correlation between the two variables.
- H1: Fiscal motivation influences satisfaction. There is a positive correlation between the two variables.

The Pearson correlation is 0,620 and this means that there is a strong positive relationship between the two variables. Thus the hypothesis 1 is accepted which states that there is a positive correlation between the fiscal motivation and the satisfaction.

Pearson coefficient for the variables non fiscal motivation and satisfaction. The following hypothesis was examined:

- H0: Non fiscal motivation doesn't influence satisfaction. There is no correlation between the two variables.
- H1: Non fiscal motivation influences satisfaction. There is a positive correlation between the two variables.

The Pearson correlation is 0,510 and this means that there is a strong positive relationship between the two variables. Thus hypothesis 1 is accepted which states that there is a positive correlation between the non-fiscal motivation and the satisfaction.

## **5 Discussion**

Since different groups are exposed to a different degree to the socio-cultural changes that take place each period of time but also to internal and external factors, they should be specifically examined. There are indeed different factors motivating the two sexes, due to their different purposes in society, still, both sexes should be treated in an equal manner. This is because it is paramount and in several working sectors paramount, for all employees to receive equal treatment, for the avoidance of discrimination and complaints. According to the result the number of men (51,8%) and women (48,2%) was about the same. The majority of the participants belonged to the age group of 45< showing a mature sample. The largest percentage of our segment had 4-7 years of working experience. Additionally, the majority of the employees had an upper education, with only 38% having solely a secondary education. The overall results reveal that the segment covered a wide range of demographics, referring to the age, educational level, years of experience and gender. The employees of the companies were asked at a separately basis to ask on the fiscal and non-fiscal motivation techniques that they receive and the degree that those motivation techniques affect their working performance. Regarding the fiscal motivation techniques, in the form of bonuses, the majority of the employees answered that they do receive fiscal motivation.

It is paramount for the company, in order to maintain a smooth and profitable operation to provide an adequate salary and further fiscal motivation. The employees of all

the companies that were examined for the purposes of this dissertation, marked that they were presented with a satisfactory salary, ensuring that as [4] mentioned that the fiscal reward should be satisfactory in order to lead to job satisfaction. Contrasting however McGregor's Theory Y which states that humans are by nature motivated to work, and agreeing with Theory X, since those fiscal rewards are indeed affecting productivity. Still not all companies provided the same fiscal rewards, having the responses varying from case to case. It should be marked that all companies provided some sort of fiscal motivation technique. This indicates that there could be room for further initiatives.

Additionally, it is really important for each company to present its employees with a pleasant, sanitary and overall satisfactory environment [6]. Such an environment will enable the employees maintain a balanced behavior, even under pressure. As questions on non-fiscal motivation techniques were purposely limited as mentioned, are the ones chosen, referred on the formal employee interaction in the form of group meetings, seminars and further training and private health coverage. These techniques, also agree with Herzberg's theory, projecting "Motivators" implying satisfaction growth [17] without however their absence stating a reason of dissatisfaction. The "Motivators" as meetings, training etc. may not be offered by all the companies in the same frequency or form, however, they surely add to the satisfaction. Although the frequency by which each company was holding its meetings differed, there is always a degree of a formal employee interaction with each other but also with the managers, getting informed about progress, long-term and short term goals. By this, interpersonal relations within the company are achieved. Training re-training and furthering studies, through meetings, seminars and other training sessions, is also very important, not only for the individual, but also for the company which benefits from the employees' skills development. The company may hire experts to talk or train its employees, but also encourage its employees to choose by themselves the training they would like to receive by offering to cover the expense of their training. Private health coverage is also a significant nonfiscal initiative and Herzberg "Motivator", however not all companies are offering it to their employees. As such, there were companies offering private health coverage and others that didn't. Taking into consideration the present condition of public healthcare in Greece, this could be a very strong initiative for employees if the company could provide it to a reasonable price. Providing feedback and praising the employees on a regular basis, is also a very interesting motivation technique that could be applied to an individualistic labor market. By this the employee not only feels esteemed but also distinct himself from the rest of his colleagues. Not all the companies examined offer a praising and feedback scheme, which could also be used as an initiative.

Overall, the responses to the questionnaire revealed that the Greek companies that participated in the research, do not all use non-fiscal motivation methods and there is a great divergence from company to company regarding the methods used, implying that there is room for further improvement and adaptation of new methods. It should be highlighted that the main motivation methods that were used, were based on fiscal motivation techniques. Thus, it should be noted that the use of fiscal motivation techniques, even at a short-term application are effective at the majority of the cases, leading to an

increase of performance of the employees. Duration however is the key to the long-term results as mentioned by [27].

## 6 Conclusions

Motivation techniques are applied to an extent in Greek companies, however there is mainly a widespread application of fiscal motivation techniques due to the special characteristics and present conditions of Greek society. This research presents some specific characteristics affected by the sociopolitical events that define the behavior of the regional companies in terms of market security but also employee satisfaction, which to an extent may be determined by the support that they are receiving by the companies creating a circle of inter-dependence. As the majority of companies use fiscal motivation techniques, they should include a larger scale of them, offering further fiscal initiatives to their employees. These initiatives will not only increase productivity, but they will also increase the level of communication between the employers and the employees, together with their level of awareness, and sense of belongingness. Additionally, the increase of meetings would add to the interpersonal interaction between the employees and the employers reducing also the possibility for any dissatisfaction to go unnoticed. The working environment might be enforced, offering greater sense of safety to the employees. Offering health coverage to their employees, increase not only the factor of safety but also the recognition of the individual needs of each employee increasing also the feeling of security at work. Constant education opportunities, will also offer to the employees the opportunity to advance, to distinct within the workplace. Taking into consideration the individualistic characteristics of the Greek workplace it should be understood that, there might not be an extensive response to all the motivational technique, still there are motivation factors that are inevitably adding to the employee's psychology and performance. There is certainly space for further development and different in-expensive non-fiscal motivation combinations that could be applied improving the overall climate of the companies, adding to the quality of employee performance and to some extent increasing the company's performance and profit.

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# Conceptualizing Employee Voice and Silence: New Directions for Research

Drilon Lajci<sup>1,2</sup> Jason Heyes<sup>2</sup> and Leslie Szamosi<sup>3</sup>

<sup>1</sup>South-East European Research Center (SEERC)

<sup>2</sup>Sheffield Management School

<sup>3</sup>The University of Sheffield International Faculty, CITY College

**Abstract.** Employee voice has received increased attention in research mainly due to the economic crisis of 2008. Attempts have been made to conceptualize employee voice and silence within different fields mainly from a Human Resource Management, Employee Relations, and Organizational Behavior perspective. Research has also been dedicated to individual factors that influence voice and silence within organizations. Studies have also been drawn in exploring the relationship between voice with engagement and involvement. Acknowledging the impact of the crisis on employees it has become challenging for organizations to promote voice and gain from valuable suggestions that may come from employees. Thus, this paper explores the recent body of research made on employee voice and new directions where research is headed. It is found that further research is needed on how voice is influenced when multinational corporations undergo foreign direct investment and decide to enter a foreign country.

**Keywords:** employee voice, employee silence, human resource management, organizational behavior, employee relations, foreign direct investment.

## 1 Literature Review

In today's highly competitive and uncertain business environment, employee comments and suggestions are critical in enhancing organizational functioning and performance. The circumstances in which organizations operate no longer allow figuring issues from the top (Morrison and Milliken, 2000). Hence, the lowest tiers of the organizations are essential in identifying issues and coming up with suggestions. Despite acknowledging the importance of valuable feedback and suggestions, individuals often perceive their working environment as an unsafe place to speak up (Milliken, Morrison and Hewlin, 2003). Therefore, it is essential to understand better the factors that facilitate and promote voice within the organization and how this can be used to gain valuable input in the decision-making process.

This presented a new, unsettling state of concerns which was coined as "voice." The interest within the academia on the concept of employee voice has grown since the works of Hirschman (1970). Its focus has fallen into different fields of Human Resource Management, Organizational Behavior, and Employee Relations. Each of these

disciplines focuses on different elements of voice. Table 1 shows different strands of literature on employee voice, their focus, form, and philosophy.

**Table 1.** Theoretical perspective across different disciplines on employee voice

HRM	Briefing; open door policy; suggestion schemes	Performance
Employee relations	Collective bargain-ing; works council; social partnerships union employee representation	Power
Organizational Behav- iour	Teams; groups	Job redesign

Source: Adapted from Fay & Wilkinson, 2011

HRM and Employee Relations strands examine the mechanisms for employees to have a say (Freeman, Boxall and Haynes, 2007). Whereas, from an OB perspective the voice is viewed as an additional communication behavior tool (Morrison, 2014).

Researchers also debate on the purpose of voice across different disciplines. HRM and Employee Relations perspectives reinforce the assumption that it is an essential right for employees to have a degree of control of managerial decisions within the organization (Gollan et al., 2014; Wilkinson et al., 2014). Contrary to these views, OB perspectives emphasize the purpose of voice on organizational improvement. This view extends the freedom that managers have in decision making, as in cases of economic crisis (Wilkinson and Barry, 2016). Research from an HRM/ ER perspective covers a wide variety of voice mechanisms ranging from; collective to individual, formal to informal, direct and indirect, and unionized or non-unionized (Willman, Gomez and Bryson, 2009). Each of this mechanism with different sets of distinguishable characteristics serves as a vehicle for voice.

In their attempt to understand a voice system, Wilkinson, Dundon, and Marchington, (2013) provide a useful framework containing the following elements: the level, degree, and range of issues as well as the form of the participation that voice takes. Research on employee voice gained increased attention following the global economic crisis of 2008. Due to the crisis, employees were faced with practices such as downsizing, work restructuring, wage reductions and reward deductions. These practices had adverse effects on employees' well-being, work-life balance, health and other aspects related to work (Chatrakul Na Ayudhya, Prouska, and Beauregard, 2017). This has led to more research on the impact of economic crisis on employee voice (Kranz and Steger, 2013; Prouska and Psychogios, 2016).

In such conditions employees often opt for silence instead of voice. Although silence appears to be the antithesis of voice, researchers argue that the reality is more complex and multidimensional (Morrison and Milliken, 2000; Pinder and Harlos, 2001). In most cases, the silence is not merely the absence of or the opposite of voice. In such

circumstances voice mechanisms are well established and using voice is promoted within the company. However, employees may still choose to remain silent. The effect of the crisis has also received attention from an employee relations angle, more specifically it has emphasized on the role of trade unions. Heyes (2013), found differences on the role of trade unions based on the country as for example unions were able to negotiate additional job-saving agreements in Germany, whereas, in the UK, weakness of trade union organization in the private sector negatively impacted the ability to negotiate.

Lately, research on voice has focused on employee engagement and involvement (Kwon, Farndale, and Park, 2016; Holland, Cooper, and Sheehan, 2017; Ruck, Welch and Menara, 2017). Findings reveal that there is a strong correlation between emotional organizational engagement with voice, although there is a need for further research on the connection of voice with engagement (Ruck et al., 2017). Furthermore, researchers recommend that organizations should develop systems and relationships that enable employees to evocatively influence decisions in the workplace based on trust (Holland et al., 2016). However, despite the growing body of literature on employee voice, there are still gaps that need to be filled. As such more research which would aid in conceptualizing employee voice within alternate disciplines (Mowbray, Wilkinson and Tse, 2015). In addition, future research on employee voice should explore the impact of mode of entry, and the effects of institutional settings of multinational corporations when they undergo foreign direct investment (FDI).

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# Information & Communication Technologies

# Argumentation Mining: Exploiting Multiple Sources and Background Knowledge

Anastasios Lytos<sup>1</sup>, Thomas Lagkas<sup>2</sup>, Panagiotis Sarigiannidis<sup>3</sup>, and Kalina Bontcheva<sup>4</sup>

<sup>1</sup>Department of Computer Science, South-East European Research Centre, The University of Sheffield, Thessaloniki, Greece

<sup>2</sup>Computer Science Department, The University of Sheffield International Faculty, CITY College, Thessaloniki, Greece

<sup>3</sup>Department of Informatics and Telecommunications Engineering, University of Western Macedonia, Kozani, Greece

<sup>4</sup>Department of Computer Science, The University of Sheffield, Sheffield, UK

**Abstract.** The field of Argumentation Mining has arisen from the need of determining the underlying causes from an expressed opinion and the urgency to develop the established fields of Opinion Mining and Sentiment Analysis. The recent progress in the wider field of Artificial Intelligence in combination with the available data through Social Web has create great potential for every sub-field of Natural Language Process including Argumentation Mining.

**Keywords:** Argumentation Mining · Web mining · Background knowledge · Artificial Intelligence · Computational Linguistics · Machine Learning · Social Media

## 1 Introduction

Argumentation Mining (AM) is a multi-disciplinary field that first introduced in 2009 from Palau and Moens [20] and gained the interest of the scientific community because of the progress in many fields in Artificial Intelligence (AI) mostly due to the development of Machine Learning (ML) techniques, algorithms and platforms. Another reason for the development of the field is the explosion in the use of Social Media and other interactive capabilities such as comments sections, on-line product reviews and personal blogs.

In human reasoning interpreting an argument is a natural process that is realized automatically by analyzing many different aspects regarding the discussing topic. However, modeling the argumentation process for the purpose of Automatic Argumentation Mining is a challenging task with doubts that is even feasible.

The main reason behind the effortless and instant grasp of the underlying argument behind from an expressed opinion is the capability of the human being to perceive the context of the expressed opinion by combining multiple sources of information. The modeling and the exploitation of the background knowledge is a difficult task especially if we consider hardware limitations both in memory and speed.

The problems related to AM become more severe when web-generated data are used as the use of slang is quite often, abbreviations are frequent and there are fallacies in the reasoning process. The aforementioned problems are the main reason behind the exploitation of domains that have structured and standardized reasoning for the tasks of AM such as law [28, 33] and scientific text [5, 12, 15].

The exploitation of data generated from Web is a more challenging task comparing to AM in structured data as the data are unstructured, the expressed opinions are short and quite often they don't include an argument. Opinion Mining and Sentiment Analysis are thriving in the era of Social Web, however AM seems not to be able to exploit the capabilities from the volume and variety of data that are offered.

In order to take advantage of the new capabilities offered from the Web in the field of AM we propose alternative paths from the implementation of the existing Argumentation theories. We propose the development of two new schemes for the exploitation of Web-generated data and small texts in general, relying on two basic principles 1) the constant production of background knowledge 2) the combination of multiple sources and the evaluation of them. In this paper we propose two abstract frameworks that are characterized by the capabilities of modification and extensibility.

## 2 Related Work

AM as a research field is quite recent but the study and the analysis on arguments in the speech are held from 4 century B.C. [2] changing forms and objectives through years. In this section we will present the Argumentation Models which have proposed at the end of the 20th century and the first attempts of AI implementing Argumentation Models before proceeding to the task of Automatic AM.

The illustration of argument parts with the use of interconnected nodes is a common technique nowadays and first introduced by Beardsley in [4]. In Beardsley's model there are defined three basic categories of arguments: 1) Convergent Argument 2) Divergent Argument and 3) Serial Argument. Beardsley's theory laid the foundation of many recent Argumentation Schemes, however it has the weakness of not defining the relationships between the nodes.

A more detailed scheme is introduced from Toulmin [30] which stands out because of the precise description of the argument entities. In Toulmin's model six functional roles were suggested, datum, warrant, backing, qualifiers and rebuttal. These roles provide a quite detailed view of the expressed arguments, showing the completeness or not of an argument. In figure 1 an example of Toulmin's theory is depicted where datum is the first part of the argument in the left, the warrant part is expressed through the conjunction since, the backing supports the warrant and both of them lead to the qualifier. The rebuttal part is optional and provides additional support to qualifier.

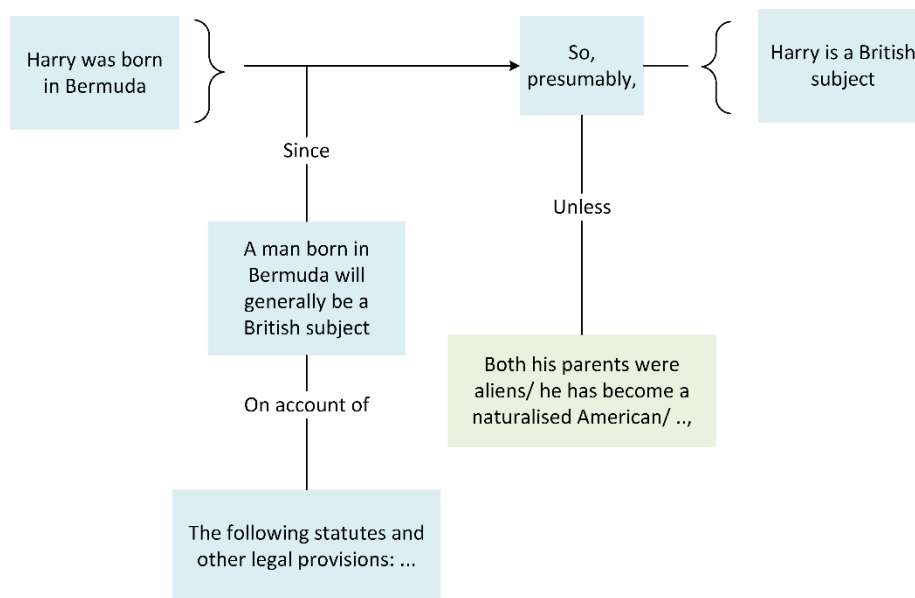
A different approach is followed in Mann and Thompson [18] aiming at the organization of the text into different regions. The proposed architecture is characterized as an open scheme with few established rules and is offered for extensions and modifications. The basic concepts of the scheme is a central part under the name *nucleus* which is framed with a number of *satellites*. The distinction of nucleus-satellite is applied

recursively until every part of the argument is associated with another one. The relations that have created are depicted either in tree-structure format either in XML format [27].

The first attempts on modeling arguments with AI techniques and models took place in the 1990's with the pioneer research of Pollock [24] which describes the connection between philosophy non-monotonic reasoning in AI. These first attempts were focused in fields where communication takes place according a series of well-established rules of communication such as law, rhetorics and scientific text.

The connection between argumentation and Logic Programming was researched in Dung [9] and in Krause et al. [16]. In both attempts the approach that was followed is the establishment of a series of rules, definitions and propositions aiming at the acceptability and the integrity of the reasoning process. A similar approach was also followed from Parsons and Jennings [22] without focusing on the optimum solution but on an acceptable compromise.

The supremacy of tailored arguments in an advising system was researched in Carenini and Moore [8] based on the generation system they have established earlier [7]. A similar problem, the solution of possible conflicts in a dialectical argumentation schemes, is researched on the work of Grasso et al. [11] with the implementation of the theory that was developed from Perelman and OlbrechtsTyteca [23].



**Fig. 1.** Toulmin's Scheme Example [30]

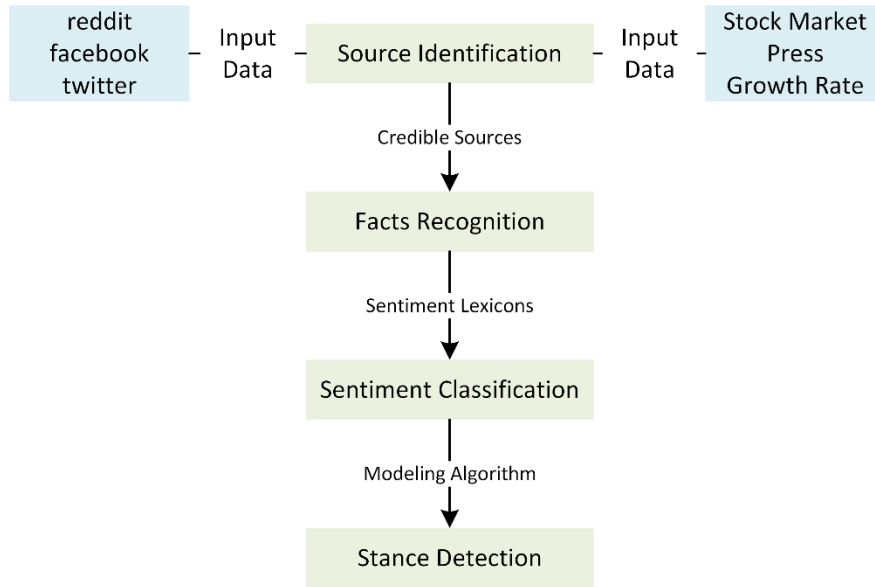


Fig. 2. Proposed Architecture for Combination of Multiple Sources

### 3 Argumentation Mining and Automatic Classification

The term of AM refers to many different interrelated tasks that can be research either independently either in the wider context of extracting arguments from text. The automatic classification of arguments is the last step of the AM pipeline and usually is the outcome of the previous steps applied on a specific task on a specific field. There is recent work which exploits Internet sources like twitter [1, 10, 19, 29], reddit [13] and other forums [6, 17, 21, 31] but none of the previous work do not combine the Internet unstructured data with objective and measurable metrics.

#### 3.1 Combining Multiple Sources

In this subsection we propose a scheme which combines multiple sources in order to assess the reliability of them. The proposed pipeline exceeds the established boundaries of AM as is it can be applied only to commercial problems revealing real processing mechanisms of the human brain. Eventually the proposed pipeline examines the question of quantity vs quality as the core of the research is to find what affects more the general opinion, the plethora of anonymous opinions or thoughtful opinions and objective metrics.

In figure 2 the proposed pipeline is presented in an abstract from which can be modified and extended. In order to illustrate better the proposed architecture we will provide step-by-step directions of every step. Assuming a controversial topic that has intrigued

both the Social Media platforms and traditional media like the recent privacy scandal of facebook<sup>1</sup>.

The first step of the proposed pipeline is the collection of data through the conversation on Social Media, articles of recognized media in their digital format and the monitoring of the stock market for the specific firm and its competitors. Provided that the collection of the data has completed the second step is the *Source Identification* of each input data followed by the stage of *Facts Recognition*. These two steps are crucial in our analysis as through research the appropriate weight will be assigned and form the final pipeline. The next step is the *Sentiment Classification (SC)* where different sentiment lexicons evaluate the collected data, SC is a well-known challenge for the scientific community and different lexicons have created [3, 14, 25, 26, 32]. The ultimate step of the proposed pipeline is the *Stance Detection* where the outcome of the architecture is finally formed and the degree of success of the modeling process is evaluated.

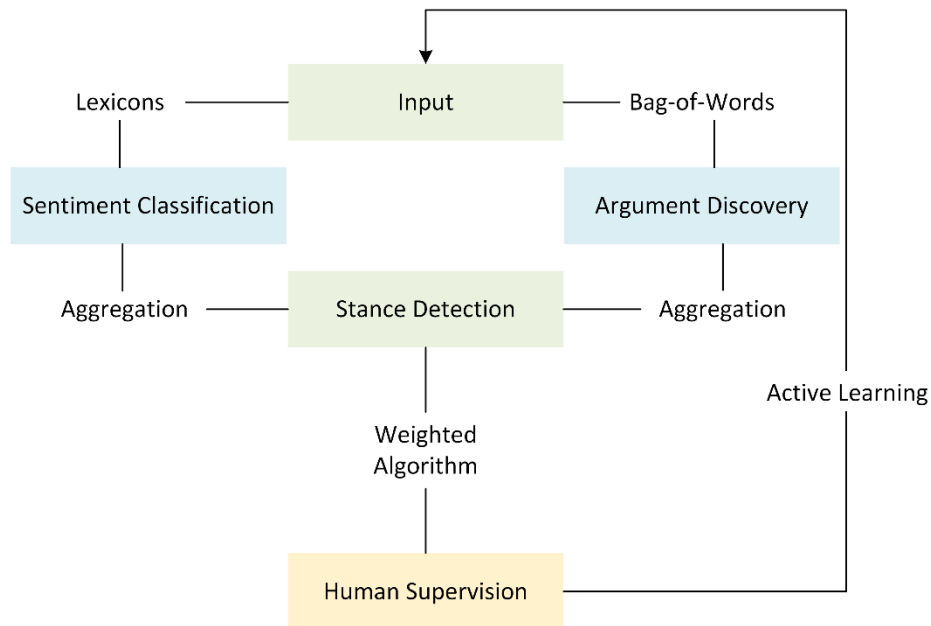


Fig. 3. Proposed Architecture for Generating Background Knowledge

### 3.2 Exploiting and Adapting Background Knowledge

Apart from the combination of multiple sources the second challenge we try to answer is the constant generation and adaptation of the background knowledge of the system. In the process of the human reasoning the interpretation of the natural language is an

<sup>1</sup> <https://www.theverge.com/2018/4/9/17214814/facebook-data-notification-cambridge-analytica>

instant operation that combines the linguistic, lexical and sentiment characteristics of the language with the background knowledge that was obtained previously from multiple sources. The most remarkable process of the human brain is the adaptation of the background knowledge depending from the subject of the discussion, the reliability of the source and the completeness of the argument itself.

In the proposed architecture, depicted in fig. 3, a constant feedback of the AM pipeline is presented for the dynamic adaptation of it. The feedback loop is based on the interaction of the human factor, which evaluates the model and proceeds in the re-designing of the system if necessary. In this way the pipeline is evaluated regularly and remains up-to-date with possible changes in the complicated environment it interacts.

For the clarification of the proposed scheme we will proceed in a step-by-step example. We have the input collected for a specific topic (e.g. facebook privacy scandal) followed by two processes, the Argument Discovery and the Sentiment Classification. In the process of Argument Discovery the effort is focused in the existence or not of an argument in the text, whereas the Sentiment Classification provide the information for sentiment tone of the text. These two processes lead to the step of the Stance Detection where the arguments in a specific topic are summarized and eventually in the Modeling step their significance and influenced are determined. The last step of the suggested model is the evaluation of it from a human perspective which could find flaws and defects in the system and could proposed modifications.

The ultimate target of AM is the automatic interpretation, evaluation and classification of arguments. However, every suggested pipeline requires the human supervision for evaluation of the proposed model, thus neither our model could avoid the human interaction.

## **4 Conclusions and Future Work**

In this short paper we provide a solid background in the area of AM covering different aspects and presenting the evolution of the Argumentation problem through time and different scientific views. We stressed the significance of the field for the better understanding of the natural language and identified the prosperous environment for the growth of the field in the era of Social Web due to the huge amount of web-generated data.

In the third section of the paper we propose two schemes in an effort to interpret and exploit the constantly changing environment of the Web providing new ideas and schemes for the task of AM. Concerning the proposed pipeline for the exploitation of different sources of input data, the pipeline is open to modification and able to cover different problems such as the location of underlying relations between crowd-sourcing and stock market or the effect of different sources of news. The second scheme stress the need for more adaptable models in the field of AM which can provide feedback from the results instead of stiff architectures that cannot adapt to new requirements and needs.

We strongly believe that the field of AM could flourish in the era of Social Web provided that the scientific community can adapt to the new conditions and exploit the



new opportunities. The proposed AM schemes should be flexible considering arguments with flaws or weakly expressed and presenting solutions for the industry such as precise recommendation system or advertising impact in Social Media. Apart from industry applications another concern AM has to face technical challenges like Big Data, Deep Learning and Unsupervised Machine Learning Techniques, technologies that could boost the field of AM and the wider area of Natural Language Process.

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# A Model for Recommending Research Articles: The case of Document Clustering

Nuhi Besimi<sup>1</sup> and Betim Çiço<sup>2</sup>

South East European University, Tetovo, FYROM  
Epoka University, Tirana, Albania

**Abstract.** In text mining, clustering and classification are the most important techniques to extract information from textual data. These are techniques which allow us to identify similar groups of textual documents or build classification models based on some similarity. This paper presents a hybrid model based on clustering and classification techniques to recommend research articles to researchers. Since the process of literature review is time consuming, our aim is to improve this process by recommending the most relevant research articles based on users' research field preferences. Finally, we present a case study for the phase 1 where we analyze the potential of document clustering using KMeans algorithms. As result we present the experiments on textual dataset.

**Keywords:** Data Mining, Text Mining, Recommendation Systems

## 1 Introduction

Application of Data Mining is becoming more and more important nowadays. Its usage is increasing every day. recommendation systems, prediction systems, statistical analysis based on data is highly used in computer science, medicine, economy and many other fields.

Researches spent too much time in reading others work and finding research questions. This process requires lots of effort in reading and classifying the relevant papers [1]. The process of literature review is a challenge task for new researchers on different fields of study. Through this proposal we try to ease the process of literature review and speed up the time for defining the research problem.

Statistical and analytics algorithms recently have shown very promising results working with structured data. However, analyzing semi-structured and unstructured data is not a straight forward task. Most of proposed solutions are ad-hoc solutions which are applied to specific problems [2][3].

In Data Mining tasks, the supervised learning methods are very important because it allows us to make predictions. The supervised learning is also known as “classification”. The classification algorithms are made of two parts. The first part is the learning part where the model is constructed based on training data. And the second part is the classification part where the model is used for prediction. There are many classification algorithms proposed. The most popular are Decision Tree Induction, Bayesian

classifier, Neural Networks, Support Machines etc. Every algorithm has its pros and cons; they have their application field and type of data they apply on. The Decision Tree Induction algorithm is a very popular classification algorithm. For a model it builds a tree which is used to classify (predict) inputs. Other techniques build different models for prediction [3][4].

Unsupervised learning methods are also very common used in data mining. Its primary purpose is to discover groups (clusters) of similar data, where elements on the same group are very similar and they differ with elements of the other groups. Cluster analysis has been widely used in many applications such as business intelligence, image pattern recognition, web search, biology, and security. It is also used to improve the recommendation systems. Also searching engines do use clustering; the cluster mechanisms improve the quality and the speed for a search. Another application of clustering is on data preprocessing, detecting outliers. By finding elements which do not belong to any cluster (group) we have detected the outliers.

Our focus is in supervised and unsupervised learning algorithm because we see a potential for building a hybrid solution with a combination of classification and clustering algorithms to build a high accurate model for textual data.

There are different tools and models proposed for recommending relevant research articles to new researchers. Mendeley is on tool example which primary focus is reference management with capabilities of recommending research articles. CiteULike [1] is another tool example for organizing research articles and also simplifying the work for the researchers. Since for both platforms the primary focus is reference management, they both recommendation capabilities by using Collaborative Filtering Techniques based on user-filtering and item-filtering.

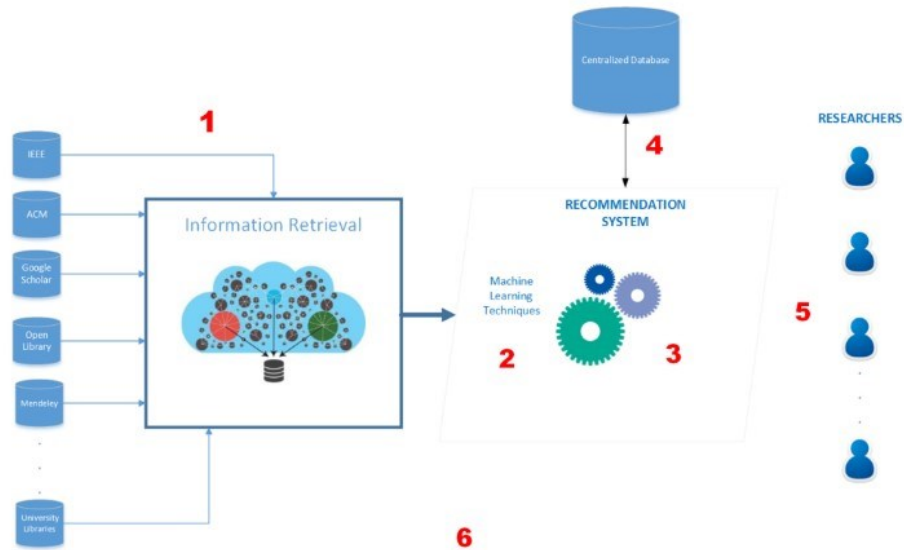
Besides tools and services for research articles, recently there are also proposed models on this topic. The recent proposed models have a common goal, to improve search and recommendation technique for research articles and make sure that as result we get the most relevant papers based on our needs. Altmetric-Driven approach is one model where the authors claim that they can enhance the performance of research paper recommender systems [12]. Topic-modeling approach is another proposed solution which has shown promising results. The recommendation system for this approach is build on top of topic modelling distribution rather than keyword [13].

Our study is focused on high accurate data mining techniques for textual data. We also analyze the need of the high efficient recommendation systems and the limitations of algorithms on big datasets.

### **“Can we automate the process of literature review?”**

The aim of our study is to collect/retrieve and analyze research/scientific articles by applying machine learning techniques to recommend research articles or/and research gaps to researchers based on their research fields. With research articles we mean scientific articles of any field where we take into consideration the following attributes: title, author, year of publication, abstract, keywords, content, contribution, results, future work, conference/journal, related articles, and bibliography.

Our plan is to propose a model which will be based on a large dataset containing research articles, which will use a hybrid model for recommending research articles to researchers. This approach will use the input parameters such as, an abstract, list of keywords, research articles or research field/s. In Fig. 1, we present the overall architecture of our research experiment.



**Fig. 1.** Overall Architecture

The first part is integrating digital research articles from various digital libraries. As result of our first phase we will have a centralized database which will be ready to build a recommendation model. The second phase is to build a model based on unsupervised and supervised learning algorithms which as an output will generate a training dataset (model) which will be used to recommend research articles. Third phase will analyze the quality of the model the main focus will be in the ability of the model to update itself and the scalability. By scalability we mean the distribution of our training set as the dataset is increasing in the future. The fourth phase will analyze the models for storing our training set to have an efficient recommendation system. Finally, we will have the researchers who are going to test, evaluate the model based on their queries.

### 1.1 Hypothesis and Research Questions Hypothesis

The process of literature review can be automated/semi-automated by using hybrid model based on text mining algorithms.

Research Questions:

1. Which unsupervised learning algorithms provide the most efficient results on large data sets?
2. Which data representation provides higher accuracy for unsupervised learning on textual documents?
3. How to generate efficient training set by using machine learning algorithms on textual documents?
4. How to construct an updatable model based on unsupervised and supervised learning algorithms?
5. What are the differences between Deep Learning and other Supervised Learning Techniques? Which techniques are the most efficient for our research?

## 2 Proposed Model

In text mining, Clustering and Classification are the most important techniques to extract information from textual data. These are techniques which allow us to identify similar groups of textual documents or build classification models based on some similarity. This paper presents a hybrid model based on clustering and classification techniques to recommend research articles to researchers. Since the process of literature review is time consuming, our aim is to automate this process and recommend the most relevant research articles based on users' research field preferences.

To construct the model, we are planning to propose we continued our literature review process by focusing on the following questions:

- What is the best document representation in text mining?

Recent text mining researches have shown that the efficiency of the algorithms is not dependent directly on the algorithms we are using; instead it is dependent on the data transformation part also. Bag of Words vs. Word2Vec representation is also an important question on today's text mining applications [5][6].

- Which are the most efficient clustering algorithms used recently?

This question investigates the most recent clustering algorithms used for textual documents. Since the first phase of our proposed model extracts groups of similar objects (text documents) we have to define which technique will be applied on our solution. Our selection criteria will be based on two factors:

1. Extract the most efficient algorithm proposed recently.
  2. Perform a direct experiment on a selected dataset which will evaluate the efficiency of the algorithms based on our needs.
  3. Based on the results of the experiment select the most suitable algorithm or combination of algorithms for our model.
- What classification techniques are used to build the most accurate models in text mining?

The second phase of our proposed model builds a model based on a selected supervised learning algorithm. The model will be used to recommend research articles and to extend the corpus of our dataset. The part of research from this question has been already presented in MECO 2017, IEEE. We analyze also the potential of using Deep

Learning – Neural Networks as part of model generation. The selection criteria will be based on our results from the initial experiments and the most recent proposed models [7].

- What is the difference between Neural Networks and traditional classification techniques?

While we have the results for traditional classification techniques, we are going to investigate if there is a need to adapt a Neural Network technique for the model generation part [8].

- Which is the best hierarchical clustering technique for textual documents?

On the recommendation phase we are planning to recommend different levels of details for a specific research topic. In order to achieve this we will use hierarchical clustering. The hierarchical clustering will be used on the generated clusters to extract the trends for a given cluster. We can choose between the agglomerative hierarchical clustering and divisive hierarchical clustering. The selection will be based on the experiments for selected datasets.

### **3 The Proposed Recommendation Model**

Why hybrid solution? The reason why we consider this model as hybrid solution is because it is built on top of combination of supervised and unsupervised learning algorithms. The first phase of the proposed model is based on clustering and identifying similar data objects based on their content. For each cluster we will identify the labels or the list of labels for the cluster. The generated clusters will be considered as a training data set to build a recommendation model.

The model is based on two key phases. In the first phase we have:

From the dataset of research articles generate clusters. This process is an unsupervised learning process, where we are going to group research articles based on their research field. Different approaches can be applied for this step like, hierarchical clustering, k-means/k-medians clustering, probabilistic clustering, which can be based on density, distribution or centroid. For document representation we can use Bag of Words, Word2Vec or any other representation model which is proven to provide efficient results.



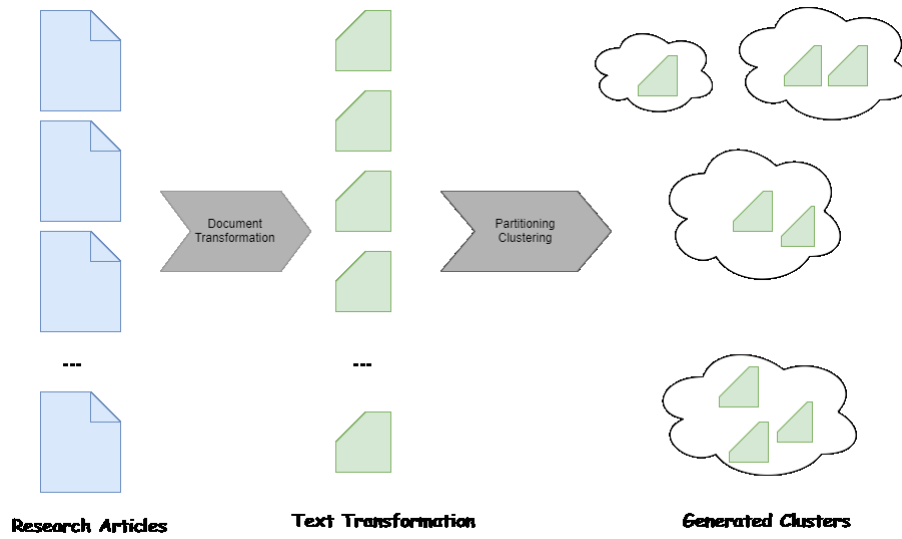


Fig. 2. Phase 1

The first phase will continue with labeling the clusters. For each cluster we will extract the keywords. Based on the keywords we will define a label or list of labels for the clusters. The reason why we need this labeling is to construct a training dataset which will be used to generate a model based on supervised learning algorithms.

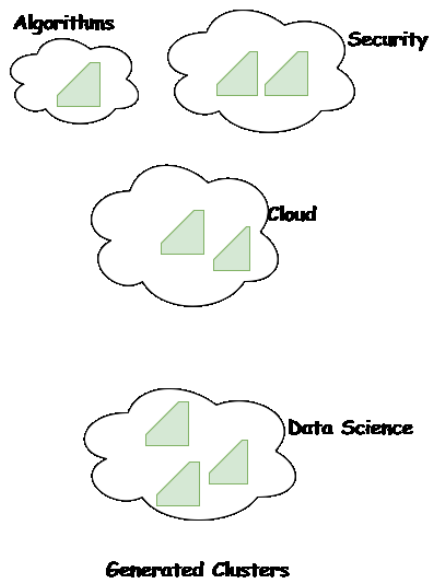
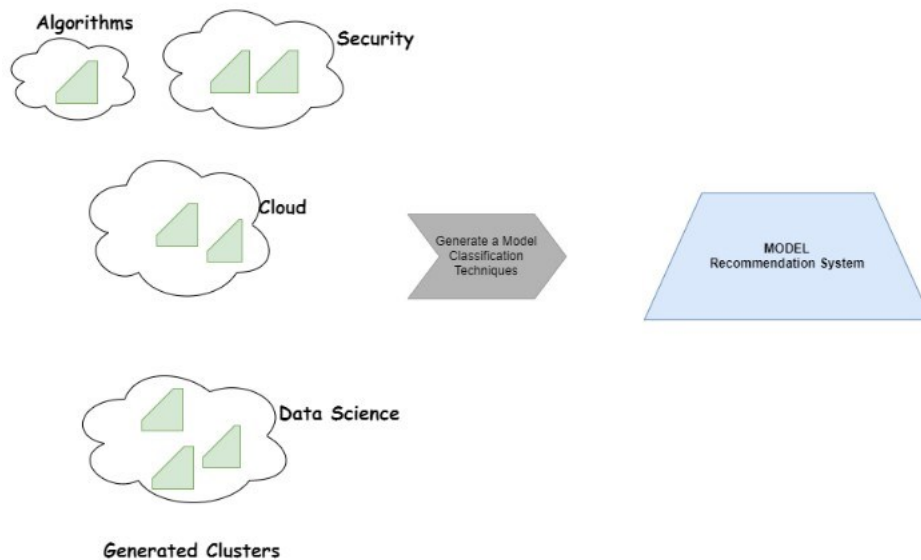


Fig. 3. Labeling the Clusters

Phase 1 will be finished now that we have constructed the training dataset based on the generated clusters. For the generated clusters we will also store some metadata like, the distance between clusters, the number of clusters, the total number of papers per cluster. The quality of the generated training dataset will be dependent on three key factors:

1. The input dataset. The size of input dataset must be above the threshold that will be defined, and the quantity of papers must meet the standards which we will define.
2. The text representation model will have an impact on the quality of the generated clusters. Bag of Words, TFIDF or Word2Vec will be used on our experiments.
3. The applied clustering algorithm. Our focus will be to choose the most efficient clustering algorithm.

The second phase will continue by using Supervised Learning Technique, we will generate a model based on the training dataset. In this part we will have to choose between various supervised learning algorithms. The training dataset will be used as basis for the recommendation system on our research work. The initial results will be to identify the most relevant research articles based on a research interest. The number of recommended research articles depends on the research field and research interest.



**Fig. 4.** Phase 2

The result of Phase 2 will be a model based on the training set from Phase 1. The Model can be a Decision Tree, Probabilistic Model, Centroids, Neural Network. Our aim is to select the most efficient model based on the literature review and the experiments. This model will help us to solve tasks like:

- Classify new research articles based on their content. Add the new research articles to the group they belong.
- Recommend research articles based on some search criteria.
- Query the input dataset for potential research gaps and trend research fields recently.

#### 4 Experiments – K-Means Clustering

This section presents experiments which are used as proof of concept for the first phase of our proposed model. Through this experiment our goal was to evaluate the potential use of unsupervised learning techniques for textual data. Therefore, for this part we have a textual dataset which is consist of sports news articles. This is because the chosen dataset was already labeled and gave use the opportunity to better validate and evaluate the results.

One way to summarize a large amount of data is to use clustering techniques to group data in a meaningful way so that the objects inside the groups, or clusters, have the most similarities while objects in different groups have the most differences. Two types of clustering algorithms are available: nested and partitioned. A nested clustering algorithm creates overlapped clusters while a partitioned clustering algorithm creates non-overlapping clusters. For programming research, in which differences between groups of programmers is required, the second type of clustering algorithm is more appropriate. For this research we considered partitioned algorithm called KMeans [8].

K-Means Algorithm is a center-based clustering algorithm in which a most representative point (object) for one cluster is chosen and the distance between the representative point and all other points (or objects) are computed. Since one can choose K clusters, this algorithm is called K-Means. This means that K representative objects (i.e. centroid or medoid) are selected. Each object is then assigned to the closest centroid and therefore, the related cluster. In the next step, the center point is updated according to the objects that have been assigned to the cluster. For the newly created centroid, the new members of the cluster are computed again. This process is repeated until the centroids do not change. At this point the members of each K cluster are known [9][10].

There are many multinational news agencies that provide news articles collected from various publishers as a service. These services, allow users to search for and collect their desired news. Users like journals, publishers, broadcasters or even individuals consider this service as very useful mainly because of the convenience, consistency, and the grammar on the news. However, having in mind that new news articles from different agencies are published continuously, the amount of such content is becoming so vast. For this reason, users are facing troubles in efficiently finding their desired articles.

Clustering represents a very good technique for solving this issue. "Clustering is the unsupervised classification of patterns (observations, data items or feature vectors) into group (clusters)". There is abundance of research on clustering and many algorithms proposed by many publications on the topic. However, to some extent, the performance on accuracy of those algorithms is still unclear.

This experiment will address the problem of the lack of knowledge about the performance on accuracy of the specific algorithm “K-means” clustering on solving the above-mentioned challenge. It is an evaluation problem because the focus is in addressing the lack of knowledge about how well something works. “K-means” clustering has been widely applied to large amount of data as one of the most efficient clustering algorithms. However, its performance, to a high extent varies from the type of data applied to. To this algorithm, it is told in advance the number of distinct clusters to be generated meaning that it begins with a k randomly placed centroid (points that represent the center of a cluster). Its performance varies from different variables, but this study treats only a few of them.

This experiment evaluates the accuracy of K-Means algorithm by taking under consideration different input parameters from sports news articles and identifies the best-practices for high accuracy clustering.

Objectives:

- To evaluate the accuracy of the algorithm by taking into consideration content and keywords as input parameters (metadata) from sports news articles.
- To evaluate the accuracy of the algorithm by changing the “k” parameter.
- To compare the results in accuracy for each type of input parameter (metadata) applied on K-Means algorithm.
- To propose the best techniques for higher accuracy related to sports news articles clustering task.

The data was gathered from Associate Press (ap.org), through a service called news agent. To gain access to using this service, a 14 days’ free trial account was created. Within these 14 days, the news agent service continuously collected sports news articles reaching the number of 16.800 articles. From 16.800 articles, 2963 articles were hand-picked by the researcher as the relevant ones. All articles are structured as XML files, and each XML file represents a single article. Each XML file has information like: publish date, title, short content, full content, location, and metadata related to the type of sport that an article belongs to. The information regarding the type of sports available within the XML files for each article represents the original outcome to which I can compare the outcomes generated from the implementation of the K-Means algorithm.

The analysis of data within this small-scale project is done through two scenarios which aim to define the accuracy of the K-means clustering algorithm. The first scenario is executed by taking the “title” of sports news articles as a parameter and the second one by taking the “keywords” as a parameter. Two of them involve changing the “k” parameter from k=3 to k=5 with the aim of evaluating also the impact of the “k” parameter for both cases. For this work, “k” represents the number of distinct sports type clusters to be generated.

Furthermore, Python was used as a programming language to implement the Kmeans algorithm for textual data. In addition to this, since the second scenario requires having keywords from each article, we have used TextBlob library in Python for extracting keywords for each sports news article.

Scenario one is executed by taking 3 and 5 different categories of sports with” full content” used as a parameter (metadata). The results are as shown in table 1 and table

2.

**Table 1.** Overall Results

<i>Category</i>	<i>Soccer</i>	<i>NBA</i>	<i>NHL</i>
<b>Total</b>	728	456	389
<b>Outcomes</b>	713	471	389
<b>Accuracy in %</b>	97.93%	96.71%	100%

Table 1 depicts the outcomes generated after the execution of the algorithm for three types of sports. For the completion of the first experiment, 728 soccer articles, 456 NBA articles and 389 NHL articles were chosen. Referring to the results in Table 1. we can conclude that:

713 out of 728 soccer articles were correctly grouped (clustered) within the first cluster which represents 97.93% of accuracy.

All NBA articles were correctly grouped within the second cluster but since 15 news articles were wrongly labeled as NBA news articles, the performance on accuracy falls to 96.71%.

389 out of 389 NHL articles were correctly grouped within the third cluster which represents 100% of accuracy.

**Table 2.** Executing the algorithm for 5 types of sports

<i>Category</i>	<i>Soccer</i>	<i>NBA</i>	<i>NHL</i>	<i>Baseball</i>	<i>NFL</i>
<b>Total</b>	728	456	389	620	781
<b>Results</b>	545	452	399	472	109 5
<b>Accur. %</b>	74.86%	99.12%	94.9%	76.12%	59.79%

Table 2 depicts the outcomes generated after the execution of the algorithm for five types of sports. For the completion of it, the same number of articles for soccer, NBA, and NHL were chosen. In addition, baseball and NFL were added with 620 respectively 781 articles. Referring to the results in Table 2. we can conclude that:

545 out 728 soccer articles were correctly grouped within the first cluster which represents 74.86% of accuracy.

452 out of 456 NBA articles were correctly grouped within the second cluster which represents 99.12% of accuracy.

All NHL articles were correctly grouped within the third cluster but since 10 news articles were incorrectly labeled as NHL news articles, the performance on accuracy falls to 94.9%.

472 out of 620 baseball articles were grouped within the fourth cluster which represents 76.12%.

All NFL articles were correctly grouped within the fifth cluster but since 314 other articles were incorrectly labeled as NFL news articles, the performance on accuracy falls to 59.79%.

Scenario two is executed by taking 3 and 5 different categories of sports with” keywords” used as a parameter (metadata). The results are as shown in table 3.

**Table 3.** Clustering algorithm using keywords

<i>Category</i>	<i>Soccer</i>	<i>NBA</i>	<i>NHL</i>
<i>Total</i>	728	456	389
<i>Results</i>	710	464	389
<i>Accuracy (%)</i>	97.52%	98.24%	100%

Table 3 depicts the outcomes generated after the execution of the algorithm for three types of sports. For the completion of it, 728 soccer articles, 456 NBA articles and 389 NHL articles were chosen. Referring to the results in Table 3 we can conclude that:

710 out of 728 soccer articles were correctly grouped (clustered) within the first cluster which represents 97.52% of accuracy.

All NBA articles were correctly grouped within the second cluster but since 8 news articles were wrongly labeled as NBA news articles, the performance on accuracy falls to 96.71%.

389 out of 389 NHL articles were correctly grouped within the third cluster which represents 100% of accuracy.

**Table 4.** Executing the algorithm for 5 types of sports

<i>Category</i>	<i>Soccer</i>	<i>NBA</i>	<i>NHL</i>	<i>Baseball</i>	<i>NFL</i>
<i>Total</i>	728	456	389	620	781
<i>Results</i>	611	483	399	482	611
<i>Accur. %</i>	83.92%	94.07%	94.9%	77.74%	78.23%

Table 4 depicts the outcomes generated after the execution of the algorithm for five types of sports. For the completion of it, the same number of articles for soccer, NBA, and NHL were chosen. In addition, baseball and NFL were added with 620 respectively 781 articles. Referring to the results in Table 4 we can conclude that:

611 out of 728 soccer articles were correctly grouped within the first cluster which represents 83.92% of accuracy.

ALL NBA articles were correctly grouped within the second cluster but since 27 news articles were incorrectly labeled as NBA news articles, the performance on accuracy falls on 94.9%

All NHL articles were correctly grouped within the third cluster but since 10 news articles were incorrectly labeled as NHL news articles, the performance on accuracy falls to 94.9%.

482 out of 620 baseball articles were grouped within the fourth cluster which represents 77.74% of accuracy.

611 out of 781 NFL articles were grouped within the fifth cluster which represents 78.23% of accuracy.

The execution time from the first experiment was faster compared to the second one. It took only 15 seconds for the first one whilst 25 seconds for the second one. The difference of 10 seconds was as consequence of the time required for generating the keywords.

The results of this study identified that parameters do have a significant impact on the efficiency of the K-means algorithm. Through the execution of two experiments which included the manipulation of three independent variables, the performance of the algorithm turned to alter.

Regarding the first question, (“How different parameters affect the efficiency of K-Means algorithm in sports news articles?”) this study identified that, different parameters do have an impact on the accuracy as well as the execution timing of the Kmeans algorithm. When grouping (clustering) news articles, one must take under consideration the parameters that lead to a better accuracy and timing. To take the most out of the performance of the K-means algorithm when implemented on sports news articles, the independent variables that lead to a better performance are described within this section.

The results after the experiments showed that, there is no significant difference between “content” and “keywords”, meaning that the accuracy of the algorithm does not differ to an impressive level, with these two parameters implemented. However, besides the algorithm accuracy, the results suggest that, when timing represents an important factor, then “content” is the parameter that leads to a higher efficiency.

The relation between content and keywords answers to some extent the second research question. However, to complement it, the results also showed that, there is an impressive relation between the “k” parameter with the two-above mentioned ones. According to the results, the number of distinct clusters to be generated (“k”), which is decided based on the preference and the need of the user, represents the most important parameter to be considered. First, the study suggests that, the bigger the number of distinct clusters to be generated the lower the performance of the algorithm. Furthermore, the results showed that, when five distinct clusters of five type of sports news articles are to be generated, then the accuracy of the algorithm turns to perform better on the

accuracy if “keywords” are applied as a parameter. However, a tradeoff between performance on accuracy and timing has to be made in this case, because when “content” is applied as parameter, the timing gets better.

Regarding the third question, (“What are the best practices for achieving high efficiency in application of K-Means algorithm on sports news articles?”), the study suggests that, the best practices for achieving high efficiency, are the following:

When a low number of clusters ( $k=3$ ) are to be generated, then “content” is the most preferable parameter to be applied. In such cases, this parameter leads to better timing, and high accuracy.

When five numbers of clusters ( $k=5$ ) are to be generated, then “keywords” is the most preferable parameter to be applied. Although the execution timing is not the best, in such cases this parameter leads to a higher performance on accuracy.

## **5 Conclusion**

In this research work we presented a model which is based on literature review > 100 research articles on the field of Data Mining, Big Data, and Text Mining. Our goal was to present a hybrid scalable model based on Data Mining Techniques which will recommend research articles to researchers based on their research interest. The main aim is to automate the process of literature review since it is proven that the process is too time consuming for new researchers. For an input data, set of research articles from a given field (e.x Computer Science, Medicine, Economy), we go through the following phases. The first phase generates clusters of research articles based on their content. As result from the first phase for each cluster we will have a label or list of labels which will be used to generate a training dataset. By using a specific supervised learning algorithm from the most recent accurate proposed algorithms we continue with the second phase which generates a model. This model will be used for classifying new research articles and building the recommendation process based on user (researcher) preferences. In addition to the whole process we have propose hierarchical clustering inside specific clusters to offer different levels of details on the recommendation phase. Finally, we expressed the results from initial experiments where we analyzed the potential of using the K-Means algorithm for the Phase 1 of the proposed models. The main reason for this initial experiment was to provide a proof of concept for the Phase 1 on of our proposed model. Since more detailed experiments will be provided for all phases, the first experiment gives us confidence on the path we provided.

## **6 Future Work**

In addition to the proposed model we our next target is focusing on more detailed experiments. The goal of experiments will be extracting the most suitable algorithms in support of our model. For future work we are planning:

- Identify the most suitable/s clustering algorithms which can be applied for phase 1.



- Experiment with different textual documents representation and evaluate the models which produce high performance in accuracy.
- Generate models based on various classification techniques to identify the most proper techniques for this task.
- Prepare a Case Study and evaluate the model based on a given dataset.

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# Aspect-based Sentiment Analysis of Albanian Texts

Majlinda Axhiu<sup>1</sup> and Bernd Freisleben<sup>2</sup>

<sup>1</sup>South East European University, Tetovo 1200, Macedonia

<sup>2</sup>University of Marburg, Marburg D-35032, Germany

**Abstract.** Currently, we are not only static observers and receivers of information, but successively, we dynamically change the information content and produce new pieces of information. Since many sentiments that express the authors' attitudes, opinions or emotions on a topic are generated, sentiment analysis has a wide range of real-world applications.

The typical sentiment analysis focuses on predicting the positive or negative polarity of the given sentence(s). This task works in the setting that the given text has only one aspect and polarity. A more detailed and complicated task would be to predict the aspects mentioned in a sentence and the sentiments associated with each one of them. This generalized task is called aspect-based sentiment analysis (ABSA).

Typically, supervised learning approaches are used for ABSA. However, having to build the tagged training and testing corpora for each language and each domain is highly time consuming and can often be achieved only manually. This is why we propose to design a language- and domain-independent system that will be based on novel machine learning approaches through which we will analyze Albanian texts and make use of Albanian data in the digital world.

**Keywords:** Aspect-based SA, Unsupervised approach, Domain independent.

## 1 Introduction

The real importance of opinions in decision making process is very high. Either for individuals or for organizations, it is important to hear others' opinions. As Wright (2009) claims for many businesses, online opinions have turned to be a kind of virtual currency that can make or break a product in the marketplace. Considering the social media, opinions can be found in many different locations starting from forums and blogs and ending at social networks. So, it is a big challenge for a human being to find relevant sites, extract related contents, read them, summarize them and present them into usable forms. This is why automated sentiment analysis systems are strongly needed.

Sentiment analysis, also referred as "opinion mining", is a set of methods, usually implemented in computer software, that perceive, measure, report and utilize attitudes, opinions, and emotions, which generally are called sentiments and can be found in online, social, and enterprise information sources (Liu, 2012).

Researchers inquire sentiments at various linguistic levels, such as: words, phrases, sentences and documents. These tasks analyze sentiments at a fine-grained level and can be used to improve the effectiveness of sentiment classification.

Recently, a new framework named aspect-based sentiment analysis (ABSA) was proposed (Thet, et al., 2010) to address this problem. An aspect refers to an attribute or element of an entity, e.g., the screen of a TV, or the number of pixels of a camera. An ABSA task typically involves several sub-tasks, including identifying relevant entities and aspects, and determining the corresponding sentiment/polarity.

An ABSA system gets as its input a group of texts referring to a specific entity. The system then attempts to detect the main aspects of the entity and to assess the average sentiment of the texts per aspect.

Given a subjective document about a target entity, the goal is to identify all the opinion tuples with the following types of information: Aspect Category Detection, Opinion Target Expression, and Sentiment Polarity.

The main issues, as Madhoushi (2015) states, are that the mostly used techniques are unable to work well in different domains, sentiment classification based on insufficient labeled data is challenging, and there is lack of sentiment analysis research in languages other than English.

## **2 Objectives And Motivation**

Regarding the popularity of sentiment analysis for detecting the opinion of the beholder for different topics and in the same time the isolation of “non-popular” languages, we have decided to focus on language-independent sentiment analysis, mainly on aspect-based sentiment analysis approaches. The main objectives of the research are:

- (Re)Design and implement an ABSA system to automatically determine the sentiments of different language texts with minimal supervision.
- Develop novel machine learning models to extract aspect categories, opinion target expressions and to determine sentiment polarity of each aspect.
- Perform ABSA over an unlabeled Albanian corpus independent of the domain.

The motivation of this research was to increase the sentiment analysis usage for less popular languages such as our local languages, Albanian and Macedonian.

## **3 Literature Review**

The notion “sentiment analysis” appeared for the first time in the 2000s, and at that time the research for this new field has started.

Sentiment analysis at its first stage focused on determining the overall sentiment of documents (Pang, Lee, & Vaithyanathan, 2002; Turney, 2002; Pang & Lee, 2008).

For document-level sentiments there were used rule-based (Turney, 2002) and machine learning approaches (Pang et al., 2002). In the first approach the phrases that were containing sentiments, were extracted and then compared to the sentiment of known-

polarity words. While in the second approach the supervised methods were used with features like unigrams, bigrams, part-of-speech tags, and word position information.

Later work studied the linguistic aspects of expressing opinions, evaluations, and speculations (Wiebe et al., 2004), the role of context in determining the sentiment orientation (Wilson et al., 2005), of deeper linguistic processing such as negation handling (Pang and Lee, 2008), of finer grained sentiment distinctions (Pang and Lee, 2005), of positional information (Raychev and Nakov, 2009), etc. While document-level sentiment analysis can give us the overall view of an opinion, looking at individual sentences within the document yields a more fine-grained analysis. The work in sentence-level sentiment analysis focuses on first identifying sentiment-bearing sentences and then determining their polarity (Yu & Hatzivassiloglou, 2003; Dave, Lawrence, & Pennock, 2003; Kim & Hovy, 2005, 2006; Pang & Lee, 2008). Both identification of sentiment-bearing sentences and polarity analysis can be performed through supervised classifiers (Yu & Hatzivassiloglou, 2003; Dave et al., 2003) or similarity to known texts (Yu & Hatzivassiloglou, 2003; Kim & Hovy, 2005), through measures based on distributional similarity or by using WordNet relationships. Another statement is that by recognizing connections between parts of a document, sentiment analysis can be further improved (Pang & Lee, 2004; McDonald, Hannan, Neylon, Wells, & Reynar, 2007; Pang & Lee, 2008). Pang and Lee (2004) leverage the relationship between sentences to improve document-level sentiment analysis. Specifically, they utilize both the subjectivity of individual sentences and information about the strength of connection between sentences in a min cut formulation to provide better sentiment-focused summaries of text. Succeeding the work in single-aspect document-level and sentence-level sentiment analysis, modeling aspect-based (also called “feature-based”) sentiment for review analysis has been proposed.

Aspect-Based Sentiment Analysis (ABSA) refers to systems that determine the opinions or sentiments expressed on different features or aspects of the products or services under evaluation (e.g., memory or performance for a smartphone). An ABSA system should be capable of classifying each opinion according to the aspects relevant for each domain in addition to classifying its sentiment polarity such as positive, negative or neutral.

Based on the used techniques, there exist three types of systems: systems that use fixed-aspect approaches or data-mining techniques for aspect selection or sentiment analysis, systems that adapt techniques from multi-document summarization, and systems that jointly model aspect and sentiment with probabilistic topic models.

Regarding the tasks of aspect based sentiment analysis, the proposed research works contain from two to four subtasks. Hamdan, Bellot and Bechet (2014) propose the steps aspect term extraction, aspect term polarity detection, category detection and category polarity detection. On the other hand, in the same year Pavlopoulos proposed task decomposition, including the steps of aspect term extraction, aspect term aggregation and aspect term polarity estimation. Later, in 2015, Sing and Ullah performed the same process through two aggregated steps: aspect term detection and aspect polarity detection. Except the category detection and its polarity, all the other tasks cover the same functionalities, even though they are organized differently (decomposed or aggregated steps).

ABSA systems with best performance mainly use manually labeled data and language specific resources for training on a particular domain and for a particular language (Pontiki et al., 2014, 2015, 2016, as cited in Pablos et al., 2017). The lately work of Ruppert et al. (2017) is also in-domain and has achieved competitive results both in document-level and aspect-based sentiment analysis.

Although among the submissions of the past years at SemEval, the mostly chosen (Wagner et al., 2014; Kiritchenko et al., 2014; Brychcin et al., 2014; Brun et al., 2014) and winning models use support vector machines, or conditional random field classifiers (Toh & Wang, 2014; De Clercq et al., 2015; Toh & Su, 2015; Hamdan et al., 2015), deep learning has also been explored in this area, such as by Wang and Liu (2015) and Kim (2014). It has been used in the form of Convolutional Neural Networks (CNNs) for aspect-based analysis at SemEval-2015 for ABSA data, and the reported performance is comparable to top systems of the 2015 task. CNNs are capable of automatically learning the patterns of small phrases which in earlier systems had to be manually specified. For example CNNs learn that 'not good' is negative, 'not bad' is positive and 'very good' is more positive than 'good' (Deriu, 2016). But, deep-learning based systems that offer very good performance also require a weighty amount of labeled data for training (Chen et al., 2017; Araque et al., 2017). On the other hand, less-supervised systems do not require labeled data for training, but they usually need some language specific resources, such as carefully curated lists of seed words or language dependent tools to preprocess the input (Lin et al., 2011; Jo and Oh, 2011; Kim et al., 2013, as cited in Pablos et al., 2017).

Since most of the research on sentiment analysis and specifically on ABSA focuses on texts written in the English language, most of the resources developed, such as corpora and lexicons, are mainly in English. The provided language-independed models also are not enough focused on the issues of languages from other families and that may result on low accuracy of ABSA. This issue has been discussed also by Hercig et al. (2016), for Czech language. Consecutively, there is done very little research on less spoken languages, such as our local ones, more specifically on the Albanian language. Among them, Biba and Mane (2014) have worked on topic-based sentiment analysis, and others (Caka, Hasanaj, Kadriu and Kabashi, 2011) have worked more on part-of-speech tagging models. Therefore, recent research trends focus more on semisupervised or unsupervised methods that needs less human labor, as well as domain and language independent techniques to get the same or better accuracy compared to supervised methods.

## 4 Hypotheses

The research will focus on the following two hypotheses:

1. Current machine learning approaches for aspect extraction and determining aspect sentiment polarity have better performance than traditional rule-based approaches for language-independent and domain-independent sentiment analysis tasks.

2. Semi-supervised or unsupervised learning methods for ABSA can achieve high accuracy (same or higher than supervised learning methods) in aspect categorization and sentiment polarity.

The result of both of the hypotheses will be tested during the experimental phase of the research, where the algorithms and the chosen approaches will be tested.

## 5 Research Questions

The research will try to answer the following questions, after which the system should be built.

- What are the challenges of applying methodologies to the Albanian language?
- What type of learning algorithms work best for ABSA of Albanian texts?
- What are the challenges of building a language-independent and domain-independent ABSA system?
- Are there innovative application areas for ABSA in the Albanian ecosystem (e.g., political opinions, medical prescriptions, company reputations, product reviews, marketing)?
- How does the language affect the processes of ABSA? (A comparison of English and Albanian/Macedonian language)

## 6 Methodology

The methodology of our research will be based on the model of W2VLDA, which is an unsupervised system based on topic modeling, that combined with some other unsupervised methods and a minimal configuration, performs aspect/category classification, aspect terms/opinion-words separation and sentiment polarity classification for any given domain and language (Pablos et al., 2017). The system is based on a LDA-based topic modeling approach combined with continuous word embeddings and a maximum entropy classifier. It runs over an unlabeled corpus of the target language and domain just by defining the desired aspects with a single seed-word per aspect. Based on this, we will make the needed extensions and adopt the approach for our goals.

## 7 Research Contribution

The design of a framework and a system that will perform ABSA in many languages and with no domain specific requirements will contribute on the wide application of sentiment analysis even in less spoken languages.

Taking into consideration the great challenges of creating the annotated corpora for any language, with our work we will contribute on skipping those steps and still gain accurate results. For the Albanian language, besides the published and unpublished tagsets, there are still no published annotated corpora. So, the limitation of using

supervised learning methods can be surpassed with unsupervised or semi-supervised methods.

Beside the contribution of creating new Albanian unlabeled corpora for unsupervised training for the ABSA task, we will also achieve new state-of-the-art results for Albanian language.

## 8 Conclusion

As it may be noted from the literature review, so far, most sentiment analysis research has focused on classifying the overall sentiment of a document into positive or negative. However, we would often like to understand what the specific sentiments towards different aspects of an entity are. In order to address this problem, in 2010, a new framework named aspect based sentiment analysis was proposed. So, for more complete analysis we need to discover the aspects and determine the polarity of sentiment on each aspect.

Based on this level of analysis, a structured summary of opinions about entities and their aspects can be produced. For product producers or service providers, they would know exactly, what are the main aspects of the product or service that customers are not satisfied for, rather than just knowing that customers are not satisfied about the service or product in general.

For customers it would be more important and this is because each customer is usually concerned about a few number of product features and does not care about the other features. Thus, customers may concentrate on the aspects they care much about rather than having an overall review of the users about the product or service.

Although there are difficulties including the rare resources that may be found in Albanian language and the variance of Albanian dialect in which people express their opinions, through the choice for working with minimal supervision and languageindependent approaches, we have decided to proceed with the idea because of the motivation to achieve greater usage of sentiment analysis in Albanian-speaking countries.

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# Recommender System for Secure Software Engineering

Astrit Desku<sup>1</sup> and Mira Mezini<sup>2</sup>

Faculty of Contemporary Sciences and Technologies  
South East European University, Tetovo, Macedonia  
Software Technology Group  
Technische Universität Darmstadt, Germany

**Abstract.** As cryptography becomes increasingly important to protect the vast amount of user data available in modern time, one needs to ensure that application developers are able to use it correctly. The most frequent problem during developing is that application developers typically lack cryptographic expertise while cryptographic libraries embody highly specialized knowledge that they fail to expose to clients at the appropriate level of abstraction. For these reason, one approach is to combine techniques and concepts from both software engineering and program analysis. In this context the main idea, would be to apply existing techniques for mining software repositories specifically to ensure that security is built in during software development. Our goal is to produce a software product API that automatically identifies the correct cryptographic algorithms to use, based on the developer's answers to high-level questions in non-expert terminology. By composing the user's selected features, the solution would automatically synthesize a secure code and a usage protocol that corresponds to the selected usage scenario.

**Keywords:** Software Development, RSSE - Recommender Systems for Software Engineering, API, C#, Data Mining Techniques.

## 1 Introduction

Software developers have always used tools to perform their work. In the earliest days of the discipline, the tools provided basic compilation and assembly functionality. Then came tools and environments that increasingly provided sophisticated data about the software under development. Nowadays, the systematic and large-scale accumulation of software engineering data opened up new opportunities for the creation of tools or APIs (Application Programming Interfaces), that infer information estimated to be helpful to developers in a given context.

Software development can be challenging because of the large information spaces that developers must navigate. Without assistance, developers can become bogged down and spend a disproportionate amount of their time seeking information at the expense of other value-producing tasks. Recommender Systems for Software Engineering (RSSEs) are software tools that can assist developers with a wide range of activities, from reusing codes to suggest developers what to do during development [1].

As it is noted on [2], large-scale software reuse is often achieved through the use of frameworks and libraries, whose functionality is exported through APIs. Using an API can be as simple as calling a function, but in practice it is often much more difficult. The flexibility offered by large APIs translates into sophisticated interface structures that must be accessed by combining interface elements into usage patterns and taking into account constraints and specialized knowledge about the behavior of the API [3].

Another sophisticated technique that helps developers during development is Code completion. It is an integral part of modern Integrated Development Environments (IDEs). Developers often use it to explore Application Programming Interfaces (APIs). It is also useful to reduce the required amount of typing and to help avoid typos. Traditional code completion systems propose all type-correct methods to the developer. Such a list is often very long with many irrelevant items. More intelligent code completion systems have been proposed in prior work to reduce the list of proposed methods to relevant items [4].

While cryptography is now available to everyone and provably it can protect private information from attackers, we still frequently hear about major data leakages, many of which are due to improper use of cryptographic mechanisms. The problem is that many application developers are not cryptographic experts. Even though high-quality cryptographic APIs are widely available, programmers often select the wrong algorithms or misuse APIs due to a lack of understanding [5].

Many studies have analyzed the usability of cryptography. Clark and Goodspeed [6] and Whitten and Tygar [7] explore misuses of cryptography components from the enduser's point of view. Their focus is on the usability of cryptographic systems which are targeted at end-users, but require far more cryptography knowledge than what can be expected from an ordinary user. Others analyze misuses of cryptography APIs by application developers. In [8] show that over 83% of the vulnerabilities they analyzed from the CVE database were due to misuses of cryptography libraries while only 17% were caused by implementation bugs in the cryptography libraries themselves.

In this paper thesis, we would intent to apply existing techniques for mining software repositories specifically to ensure that security is built in during software development.

## 2 Related Work

Nowadays, many studies conducted in this area, some of them have been resulted with API or tools that can be integrated on development platforms.

In [2] is presented a comprehensive survey of research on inferring API properties in the last decade (2000 - 2011). First paper in the area of learning to reuse patterns is from Michail presented on [9], who use association rule mining to document typical API usage. In their study presented on [10] Li and Zhou also use association rule mining for PR-Miner. They learn the rules on item sets of program elements to automatically extract general programming rules [4].

Another study is conducted by [11] where is presented the FrUiT who is a Framework Understanding Tool integrated into Eclipse that applies association rule mining

on the class level. As is described in their paper, they use three kinds of properties to learn the rules for an example class: all method calls existing in that class, the list of extended classes, and the list of overridden methods. The approach is evaluated using three case studies with rules learned for the SWT framework from code shipped together with the Eclipse IDE.

In [12] was proposed the code completion tool InSynth. This study, it does not require a receiver object as input, but instead the expected type of an expression which should be completed. Knowing the expected type, they search for possible expressions like constructor calls and method calls in reachable APIs and fit available locals as required arguments. They use weights to guide their search, but potentially propose all possible solutions, whereas our approach proposes only typical usages which are considered helpful in the current context.

Other work by [13] shows that source code contains regular and predictable utterances, similar to natural languages. They apply n-gram based techniques on program tokens to learn statistical models of programs. Their experiments prove that it is possible to predict potential tokens. Compared to our approach, they are not limited to code completion of method calls. However, this generalization results in a lower prediction quality.

In the [5], authors have presented a software product line called OpenCCE, which in reality is an Eclipse plugin. This solution combines the advantages of documentation and program analysis with ease of use and availability. In fact, solution separates API users from the domain knowledge required to understand these APIs through an expert system.

The OpenCCE intend to guide developers through selecting the relevant cryptographic components to use, automatically generates the required code with the correct API calls for them and analyzes the final program to ensure that no threats have been introduced, during initial development, or during program evolution. As was noted in this paper the main goal of OpenCCE is not to detect intentional malicious code, but to avoid unintentional mistakes by non-expert developers [5].

Another issue that will be considering in this thesis is detecting security anomalies during development using Machine learning techniques that are popular for so many real time problems. In their review [14] had treat for machine learning techniques. For each of them they have been discussed about behavior of algorithm using in development cycle.

Based on [14], anomaly detection techniques can be sub categorized into Statistical Approaches, Cognition and Machine learning. Today, Machine learning techniques are popular for so many real time problems.

Machine learning techniques are based on explicit or implicit model that enables the patterns analyzed to be categorized. It can be categorized into Genetic Algorithms, Fuzzy Logic, Neural Networks, Bayesian networks and outlier detection [15].

### 3 Proposed Approach and Methodology

The most frequent problem during developing is that application developers typically lack cryptographic expertise while cryptographic libraries embody highly specialized knowledge that they fail to expose to clients at the appropriate level of abstraction [5].

For these reason, one approach is to combine techniques and concepts from both software engineering and program analysis.

In this context the main idea of this thesis, would be to apply existing techniques for mining software repositories specifically to ensure that security is built in during software development. In this order the Mining techniques would extract patterns of proper usage of cryptographic components. The latter can either be used to suggest developers what to do during development or to discover anomalies, i.e., when code being developed does not match extracted patterns.

As a final work of this research, it is meant to be a solution that helps C# developers selecting the relevant cryptographic components to use and automatically generate the required code with the correct API calls for them. Also, reduce adoption barrier for non-crypto experts by guiding developers to find proper solutions for their cryptography needs.

Particular feature of code (i.e., cryptographic algorithm) maps into corresponding C# code and a usage protocol describing API restrictions. By composing, the user's code features, the solution would automatically synthesize a secure code and a usage protocol that corresponds to the selected usage scenario.

Below in the Fig.1 it is shown an overview of our proposed solution. Application programmer through interactive dialog sends code to Analysis Engine, which will analyze the code based on code collection repository. In this process we will use one of data mining algorithm ( i. e. Neural networks ). After that, API will be able to generate recommended code for that code.

### 4 Hypothesis and Research Questions

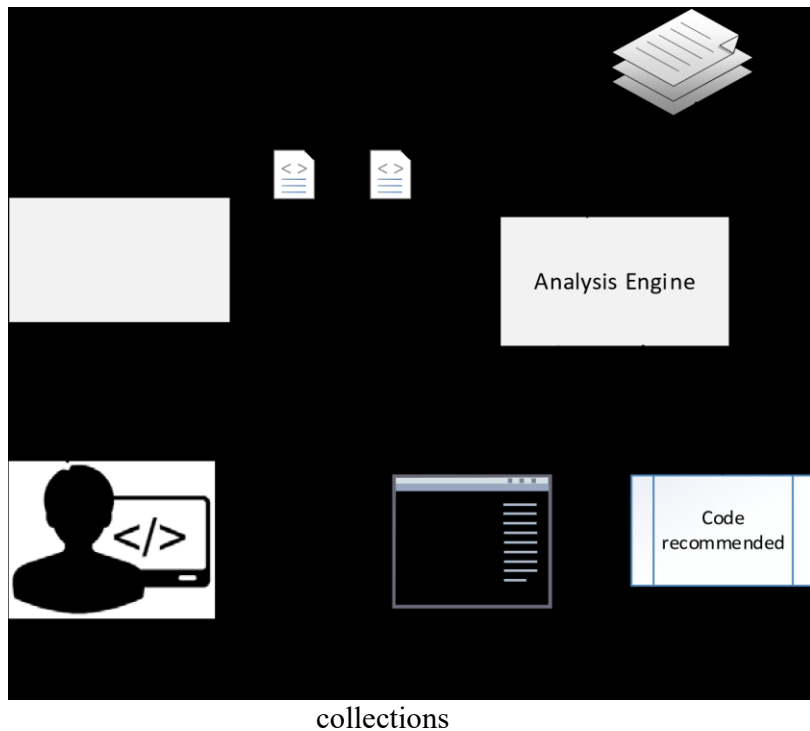
In the doctoral thesis, we will concentrate on the following hypothesis and research questions:

1. Creating an API recommender system for software development, which will recommend appropriate actions to software developers to automatically ensure that their software is more secure, will be possible and effective in improving software security.

RQ1: Is it possible to explain discovered issues in a way understandable to the developer and assist in resolving them?

RQ2: How can we ensure that we learn from correct code?

2. Supporting automatic generation of code and automatic validation of code that uses cryptography securely.



**Fig. 1.** Proposed conceptual model and solution workflow

RQ1: Is it possible to reduce adoption barrier for non-crypto experts by guiding developers to find proper solutions for their cryptography needs?

RQ2: Is it feasible to support automatic generation of code that uses cryptography securely?

RQ3: Is it feasible to support automatic validation of code that uses cryptography? Automatic code generation can be realized based on patterns that would extract using machine learning techniques.

RQ1: Which algorithm techniques would extract patterns of proper usage of cryptographic components in best way?

RQ2: Which machine learning algorithm is the best for detection security anomalies during development?

3. Other hypotheses that can be dealt during next phases of study.

## 5 Conclusion

Using cryptography to provide the code if it is not used correctly can cause significant problems in the meaning of that code. In this way, the code may become uncertain and therefore unusable.

Nowadays there are different cryptography protocols which, to be effective, should be used in their proper form. Non-cryptography experts can cause problems when they use different protocols to provide their code.

Therefore, RSSE - Recommender Systems for Software Engineering can be an option for this group of developers. In this paper, we have proposed a software solution that can be used by C# developers as a recommendation for a correct code recommendation that should be written for the implementation of the respective protocol.

Since the developer may change the generated code and how it is integrated with its own application, there is necessity also to apply static-analysis techniques to ensure the code complies with the usage specifications of each component.

With this solution it is intended to reduce adoption barrier for non-crypto experts by guiding developers to find proper solutions for their cryptography needs.

Another goal by this proposal would be to suggest developers what to do during development, where they need to use cryptographic components. An important issue that thought to address with this solution is discovering anomalies during development security issue, for non-security developer's experts.

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# Dynamic Resource Allocation in Cloud Environments

Artan Mazrekaj<sup>1</sup>, Dorian Minarolli<sup>2</sup> and Bernd Freisleben<sup>3</sup>

Faculty of Contemporary Sciences and Technologies  
South East European University, Tetovo, Macedonia  
Faculty of Information Technology  
Polytechnic University of Tirana, Tirana, Albania  
Department of Mathematics and Computer Science  
University of Marburg, Marburg, Germany

**Abstract.** Dynamic resource allocation in cloud computing is the process of dynamically assigning resources to cloud applications according to current workloads. In the Infrastructure-as-a-service (IaaS) cloud computing service model, resources are allocated in the form of Virtual Machines (VMs) that can be resized and live migrated at runtime. The primary goal in a data center is to avoid wasting resources as a result of under- and over-utilization, which may result in violations of the Service Level Agreement (SLA) between the customers and the cloud provider. To satisfy the demands of users in a cost-effective way, the cloud providers must manage resources in an efficient manner. Our goal is to develop a distributed approach for dynamic resource allocation in cloud environments in order to maximize a global utility function.

**Keywords:** Cloud Computing, Dynamic Allocation, Live Migration, Virtual Machines.

## 1 Introduction

Cloud computing has become an effective solution for providing a flexible, manageable, on-demand and dynamically scalable computing infrastructure for many applications. Cloud computing also is an important trend in the development of computing technologies, systems and architectures, and receives great interest from academia and industry.

In general, this cloud computing has enabled businesses, governmental organizations and other institutions to benefit in time, quality of service, management, and operational cost. From the point of view of enterprises, providers and consumers, other benefits are: cost effective on-demand self-services, high efficiency, availability, flexibility, scalability and reliability, good resource utilization, using applications as utilities over the Internet, configuring applications online, and available development and deployment tools. Cloud consumers can use resources according to the pay-as-you-go model, where payments are made depending on consumption, which also is a benefit to consumers.

Cloud service models can be classified into three groups: (1) Software-as-a-Service (SaaS) where applications that are running in a cloud infrastructure can be accessed by various consumers' devices through a thin client interface (such as a web browser); (2) Platform-as-a-Service (PaaS) provides developers with a platform where they can develop, test, deploy and host different applications; (3) Infrastructure-as-a-Service (IaaS) provides consumers with computing resources, such as processing, storage, networks, and other fundamental resources.

In this paper, we focus on the IaaS model. To increase the efficiency of management of computing resources in a cloud infrastructure, virtualization technology plays a key role in modern data centers. The use of virtualization technologies has greatly reduced operational costs, has enabled the creation of a suitable environment for application development, debugging, and testing. In addition, this increase in computing efficiency results in lower space, maintenance, cooling and electricity costs [2]. Cloud computing infrastructures based on virtualization technology consist of multiple virtualized nodes, in which multiple applications and services are running in VMs [1]. The virtualization layer uses lower-level resources to create multiple VMs known as a Virtual Machine Monitor (VMM). However, the dynamic allocation of resources to a virtualized infrastructure is a complex issue, based on the large number of physical machines in the data center, rapid increase in demand and workload. Considering this complexity, it is necessary to develop adequate resource management mechanisms.

## 2 Related Work

Dynamic VM consolidation in a data center is a complex but important process to increase the overall utilization of physical resources and the quality of services. To keep the use of resources under control, resource consumption should be monitored periodically for physical machines and VMs in a datacenter.

Solutions to the problem of VM consolidation and mapping with physical machines (PMs) need to address the following issues: a) when to start VM live migration, b) which PM is targeted as a source for VM live migration, c) which VMs need to migrate from selected VMs, which is the destination PM to place the selected VMs.

These issues have been addressed by the different research works.

There are several approaches that consider the VM consolidation process.

Wood et al. [3] propose a system called Sandpiper to detect overloading PMs and creates a new mapping of physical to virtual resources, resizing VMs, and initiating migrations. To detect overloaded physical machines, the Sandpiper collects the usage statistics for VMs and PMs to create a mirror of resource usage, and then applies prediction techniques.

Beloglazov and Buyya [4] propose an adaptive heuristic for dynamic consolidation of VMs based on the statistical analyses of historical data. To detect whether a PM is overloaded or under-loaded, the authors use lower and upper thresholds. Methods that are used for host overloading are Median Absolute Deviation, Interquartile Range, Local Regression and Robust Local Regression. To select VMs to migrate from overloaded and under-loaded PMs, the authors propose three policies: Minimum Migration

Time Policy, Random Choice Policy, and Maximum Correlation Policy. For VM placement, they use Power Aware Best Fit Decreasing (PABFD). This algorithm is a modification of the Best Fit Decreasing (BFD) algorithm. The primary focus of the authors' work is to reduce energy consumption; other performance metrics are not considered.

Murtazaev and Oh [5] propose a server consolidation algorithm called Sercon to minimize the number of used servers and the number of migrations. Sercon takes into account a threshold value so that the CPU's PMs do not reach 100% of the utilization that leads to performance degradation. This algorithm migrates VMs from the least loaded nodes to the most loaded ones.

The most of existing dynamic VM consolidation approaches are centralized, but a centralized controller does not scale well for large cloud infrastructures. This is a problem in many directions such as a communication bottleneck, a single point of failure in terms of reliability, complexity in the optimization of several objectives simultaneously, not flexibility and lack of interaction between the controllers, and so on.

There are several works that apply prediction techniques and algorithms for resource allocation in cloud infrastructures.

Sheng et al. [6] propose a prediction method based on the Bayes model to predict a mean load over a long-term time interval. They evaluate their method using Google data center traces for one month with thousands of machines.

Prevost et al. [7] propose a framework combining load demand predictions and stochastic state transitions models in order to optimize resource allocation by minimizing the energy consumed. They use neural network and autoregressive linear prediction algorithms to forecast loads in cloud data center applications. To predict host utilization they use statistical approaches and neural networks.

Bobroff et al. [8] propose a dynamic server consolidation and migration algorithm by combining time series forecasting and bin packing heuristic techniques to minimize the number of physical machines required to support a workload. However, their algorithm does not treat the number of migrations required to a new placement.

With regard to the workload prediction, the most existing approaches base physical machine overload and underload detection on current or short term predictions of resource usage and static usage thresholds. Actually, this way of prediction can cause stability problems and unnecessary live migrations.

Our approach will base overload and underload detection on long term predictions of resource usage by taking into account prediction uncertainty. To take into account the uncertainty of long-term predictions, the use of a probabilistic distribution model of the prediction error can be a useful solution.

Some authors have investigated the use of hierarchical architectures for VM consolidation.

Jung et al. [9] propose a control architecture called Mistral that optimizes total utility. Mistral controllers manage a set of physical machines. The authors argue that Mistral can be configured as a multi-level hierarchical controller to allow the management of large-scale systems.

Feller et al. [10] propose a scalable and fault-tolerant VM management framework called Snooze. This framework uses a hierarchical architecture consisting of three software components. A Local Controller (LC) controls the physical machines. These local

controllers are managed by a Group Manager (GM). Finally, at the highest tier of the architecture is a Group Leader (GL) that distributes VM requests from the users between the GMs. Snooze also supports power management and VM consolidation aspects.

In our previous work, we have proposed a novel distributed VM resource allocation approach that uses a utility function based on multi-agent systems [11]. Our approach uses a utility function based on host CPU utilization to drive live migration actions. Experimental results show reduced service level agreement violations and a better overall performance compared to a centralized approach and a threshold-based distributed approach.

### 3 Proposed Approach and Methodology

Based on the existing approaches, there are several challenges in terms of dynamic allocation of resources in Cloud computing. Some of these challenges that need to be investigated further are:

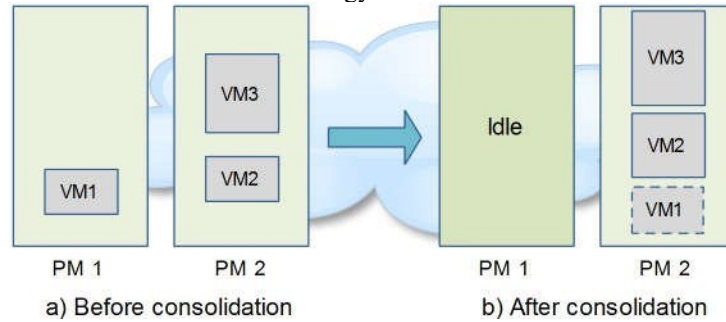
- Building a distributed model for dynamic resource allocation to avoid a single point of failure and offer scalability in large-scale clouds.
- Long-term prediction of PM workloads. The variability of workloads directly affects the performance of physical machines. The prediction for several steps ahead in the future can increase performance in resource allocation, enabling cloud providers to predict overload and underload states before they happen and to make decisions for live migrations of VMs. In this case, prediction errors should be treated and uncertainty should be tackled.

One of the most important mechanisms for dynamic workload management in cloud infrastructures is live migration of VMs from one PM to another. Live migration of VMs offers the possibility for allocation of resources to running services without interruption during the migration process, which is important for services with particular Quality of Service (QoS) requirements [12].

In general, live migration of virtual machines has several benefits, including:

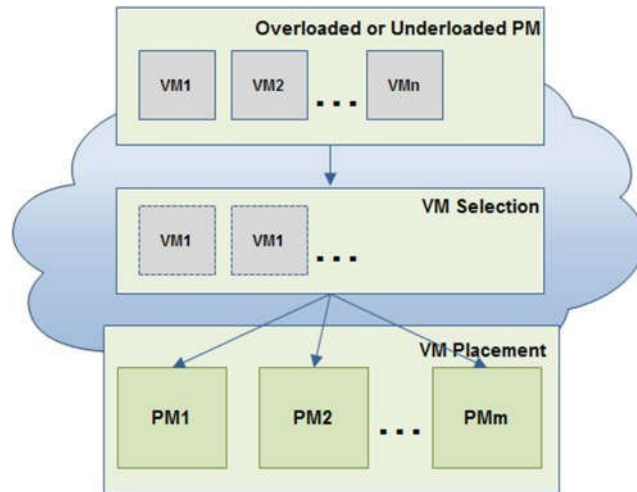
- Load balancing: provides high throughput and availability.
- Manageability and maintenance: movements of VMs and shutdown of hosts for maintenance.
- Minimum violation of SLA: meeting the SLA requirements between cloud providers and cloud users.
- Energy management: consolidation of VMs, switching off underutilized servers to reduce the data center's heat loss and power consumption.
- Improved performance and reliability: application performance will not be degraded.
- Improving the utilization of resources.
- Reducing management costs.

In Figure 1, we have present an example of VM consolidation where some of the under-utilized PMs can be released to save energy in data centers.



**Fig.1.** An example of VM Consolidation.

The process of live migration of VMs can be divided into three general stages: (a) overloaded and underloaded host detection, (b) VM selection and migration, and (c) VM placement. To illustrate this process, we present it schematically in Figure 2.



**Fig. 1.** VM Consolidation Stages

We describe the stages of VM consolidation process in the following:

Stage 1: It is known that the number of PMs in a datacenter is large and each PM has their VMs that execute different applications, and this presents a challenge to measure their load. To detect whether any of the PMs is overloaded or underloaded, a continuous monitoring process by analyzing historical data of application workload and resource usage should be performed. Based on historical data the PMs' workload, several steps (some time intervals) in the future should be predicted. Based on this prediction, the cloud provider makes a decision for a migration. The ideal case to be achieved is that, based on long-term workload prediction, a decision for live migration of VMs is made.

Stage 2: Another challenge in VM consolidation is which of the VMs from the overloaded or underloaded PM will migrate to other PMs. Potentially there can be more than one VM that will be selected for migration. A suitable VM should be selected based on a monitoring process through the VMM to convey the applications' workload and the resource usage within the VM.

Stage 3: After selecting suitable VMs (one or more), another issue is to target a suitable destination PM. Potentially, more than one PM can be a destination for migrating VMs. Therefore, the state of PMs should be monitored to see if they are overloaded or underloaded. Also, the state of the destination the PM should be predicted exactly after VM placement in order to ensure that is not overloaded.

To explain all steps of VM consolidation based on live migration, we present a flowchart in Figure 3.

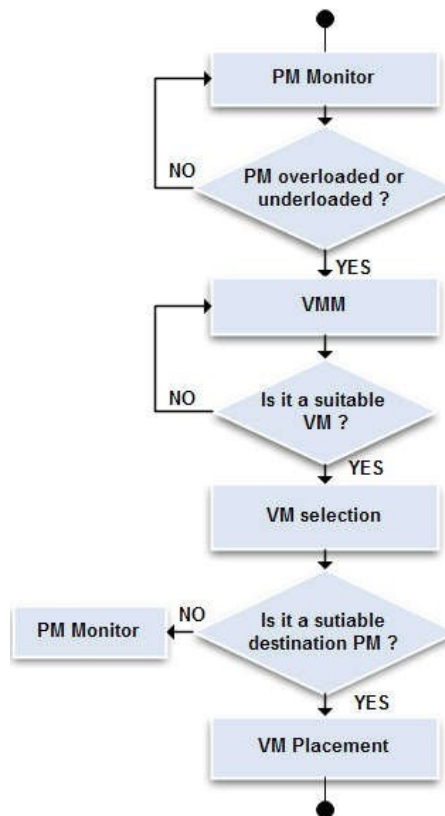


Fig. 3. VM consolidation flowchart

*Overloaded and Underloaded Host Detection.*

A major challenge for live migration of VMs is detecting when a host is overloaded or underloaded. Problematic is the selection of the overload utilization threshold. Due to unpredictable and dynamic workload, a static overload utilization threshold is not suitable. In principle, a host is considered as overloaded when during the resource usage

monitoring process the actual and predicted next value exceeds a specified upper utilization threshold. Furthermore, a PM is considered underloaded then when actual and predicted next value exceeds a specified lower utilization threshold.

#### *VM Selection.*

If a PM has more than one VM running on it, then the challenge is how to select the VM for migration when a PM is overloaded or underloaded. In this case, a VM selection policy is needed to efficiently react in correspondence to the assigned utilization threshold (for upper and lower threshold).

#### *VM Placement.*

Another issue in VM consolidation after we have selected a VM for migration is to select on which host to place. In the VM placement phase, the destination host needs to analyze carefully whether it will be overloaded after the migration process. Many authors see the VM placement problem as a bin-packing problem. Some popular solutions for the bin packing problem that are used for VM consolidation problems are: First Fit (FF), First Fit Decreasing (FFD), Best Fit Decreasing (BFD), Worst Fit Decreasing (WFD), and Second Worst Fit Decreasing (SWFD) [14-15].

In general, VM Placement schemes that can be classified as being based on: graph theory, genetic algorithms, automata, greedy algorithms, constraint programming, integer programming, ant colonies, and particle swarm optimization.

An important fact which should not be ignored is that the live migration of VMs can lead to performance degradation and energy overhead. The Migration Costs can be divided into: a) Performance of Migration, with the important parameters as they are Total Migration Time and Downtime; b) Energy Overhead, and c) Performance loss of VM, with parameters Execution Time and Throughput [13].

Also in terms of live migration cost we will also deal with other performance metrics that are described in section 3.1. Based on these parameters, we will focus on designing an accurate live migration model considering its cost through lowcomplexity algorithms.

### **3.1 Performance Metrics**

To increase efficiency in VM consolidation and QoS at an acceptable level, the overall performance should be evaluated through several metrics, like energy consumption, number of VM migrations, SLA violations, performance degradation due to migration, and both energy consumption and SLA.

- **Energy consumption (E)** represents a key parameter, since a major goal of VM consolidation is to reduce energy consumption. Energy consumption of the data center can be generated from various sources, such as CPU, memory, power supply units, disk storage boxes, and cooling systems.



- **Service Level Agreement Violations (SLAV)** is an important metric to measure QoS. Actually, SLA is the agreement between cloud provider and consumer in terms of maximum response time and minimum throughput.
- **Number of VM migrations:** Live migration of VMs is a costly operation taking into account parameters like amount of CPU processing on a source PM, the network traffic between the source and destination PMs, downtime of the services, and total migration time [5]. Therefore, a reduced number of VM migrations means efficient consolidation.
- **Energy consumption and SLA violation (ESV):** ESV is a metric that combines energy and SLA violations:

$$ESV = E \cdot SLAV \quad (1)$$

where  $E$  is energy consumption and  $SLAV$  is the SLA violations of all VMs.

## 4 Hypothesis and Research Questions

In the doctoral thesis, we will concentrate on the following hypothesis and research questions:

- I. Long-term workload prediction of resources can improve physical machine overload and underload detection in cloud infrastructures.

RQ1: How to make long-term predictions of physical machine workloads by predicting CPU utilization for detecting their overload and underload states.

- II. The selection mechanism to choose a VM (from the list of VMs) that runs on overloaded and underloaded PMs is based on migrating VMs to a chosen destination PM.

RQ1: Which VM needs to migrate (selection of VM).

RQ2: Which is the destination node, and placement of the selected VM.

- III. Coordination between local agents in a distributed resource management approach can avoid conflicts and improve overall resource allocation in cloud infrastructures.

RQ1: How to develop a distributed multi-agent resource allocation approach for cloud infrastructures.

RQ2: How to coordinate local agents and avoid conflicts between them.

## 5 Conclusion

Efficient resource management in cloud computing is of great importance for increased utilization of resources, resulting in higher scalability, and reduction of energy and cost. Most of the existing approaches for VM consolidation are based on live migration decisions and overload detection on resource usage in a short interval of time, for a few steps in the future.

In this paper, we discussed several issues of VM consolidation in a cloud environment. First, making the decision for live migration should be based on long term predictions of resource usage of several steps ahead in the future. Second, approaches to dynamic resource allocation should be based on using a distributed architecture to avoid a single point of failure. In this context, the idea is that the decision making responsibilities for the migration of VMs from one PM to another in the cloud infrastructure should be based on the distributed architecture. Third, the VM consolidation algorithms should take into account resources such as CPU, memory and network I/O, since they have a significant impact on the overall performance. Finally, to further optimize VM consolidation, other factors such as security and network traffic should be considered.

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# A security model for semantic stream reasoning systems

Admirim Aliti<sup>1</sup> and Kozeta Sevrani<sup>2</sup>

<sup>1</sup>South East European University, Tetovo 1200, Macedonia

<sup>2</sup>University of Tirana, Tirana, Albania

**Abstract.** State-of-the-art security frameworks have been extensively addressing security issues for web resources, agents and services in the Semantic Web. The provision of Stream Reasoning as a new area spanning Semantic Web and Data Stream Management Systems has eventually opened up new challenges. Namely, their decentralized nature, the metadata descriptions, the number of users, agents, and services, make securing Stream Reasoning systems difficult to handle. Thus, there is an inherent need of developing new security models which will handle security and automate security mechanism to a more autonomous system that supports complex and dynamic relationships between data, clients and service providers. We plan to validate our proposed security model on a typical application of stream data, on Wireless Sensor Networks (WSNs). In particular, WSNs for water quality monitoring will serve as a case study. The proposed model can be a guide when deploying and maintaining WSNs in different contexts. Moreover, this model will point out main segments which are most important in ensuring security in semantic stream reasoning systems, and their interrelationships. Both qualitative part and quantitative parts of the research should result with important findings, which should also contribute in future directions of research in security in semantic stream reasoning systems. The security model in itself should be an incentive for other researchers in creating other models to improve information security within semantic stream reasoning systems.

## 1 INTRODUCTION

The Web is highly dynamic: new information is constantly added, and existing information is continuously changed or removed. It has been estimated that every minute on the Internet 600 videos are uploaded on YouTube, 168 million e-mails are sent, 510,000 comments are posted on Facebook and 98,000 tweets are delivered in Twitter (Go-Gulf 2017). In these scenarios information changes at a very high rate, so that we can identify a stream of data on which we are called to operate with high efficiency. In the last few years, several researchers and practitioners have proposed solutions for processing streams of information on-the-fly, according to some pre-deployed processing rules or queries (Cugola et al., 2012). This led to the development of various Data Stream Management Systems (DSMSs) (Babcock et al., 2002) and Complex Event Processing (CEP) systems (Luckham, 2001 and Etzion et al., 2010) that effectively deal with the transient nature of data streams, providing low delay processing even in the presence of large volumes of input data generated at a high rate. However, DSMSs lack the support

of performing complex reasoning tasks, CEP do not support reasoning, while Semantic Web caches all the knowledge base. As a result, a number of recent works propose to unify reasoning and stream processing, giving birth to the research field of Stream Reasoning (Margara et al., 2014 and Della Valle et al., 2016). In 2009, stream reasoning was defined as an “unexplored yet high impact research area”. A number of its implementations are currently in place including C-SPARQL (Barbieri et al., 2010), StreamRule (Mileo et al. 2013), StreamJess (Jajaga et al., 2016), C-SWRL (Jajaga and Ahmedi, 2017), ETALIS (Anicic et al. 2010), EP-SPARQL (Anicic et al. 2011) etc.

Typical applications of stream data are Wireless Sensor Networks (WSNs). WSNs are spatially distributed autonomous sensors to monitor physical or environmental conditions, such as water quality, temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. Modern approaches are bidirectional, also enabling control of sensor activity (Zanjireh and Larijani, 2015).

The Semantic Web in general, and WSNs in particular, create new security challenges due to its completely decentralized nature, the meta data description, the number of users, agents, and services. Security challenges associated with the Semantic Web involves the ability to handle security and to automate security mechanism to a more autonomous system that supports complex and dynamic relationships between data, clients and service providers.

There is a need to develop a model which would provide Semantic Web services that are relevant to the user request, and only to those users who have got the access rights. Different authors have indicated different aspects that should be considered while designing an access control mechanism for the Semantic Web services (Gondara, 2011). For instance, Gondara (2011) points out the need that Access Control Mechanism should satisfy composite web services, than turns the focus on semantic relations among concepts, than the incorporation of policies in Access Control, than credentials consideration, than the fact that authorization should be considered over authentication, etc. Thus, there is an inherent need for a unique mechanism or model that is able to satisfy the complex requirements of an access control of WSN network.

When creating a WSN network, many times we see a focus on data encryption, which is important too. But, say after successful encryption of data chances of device itself being hacked still exist. If there is no way to establish the authenticity of the data being communicated to and from certain WSN node, security is compromised (Singh, 2016). For example, if we build a temperature sensor for smart homes. Even though you encrypt the data it transfers, if there is no way to authenticate the source of data then anyone can make up fake data and send it to your sensor instructing it to cool the room even when its freezing or vice versa. Authentication issues may not be upfront but they definitely pose a security risk. There are several researches in this direction, more notably in recent years the PAuthKey authentication scheme proposed by Porambage et al (2014). They propose a pervasive lightweight authentication and keying mechanism for WSNs in distributed Internet of Things (IoT) applications, in which the sensor nodes can establish secured links with peer sensor nodes and end-users. The established authentication scheme PAuthKey is based on implicit certificates and it provides application level end-to-end security.

In WSNs we also need secure XML. According to Hamid (2009), access must be controlled to various portions of the document for reading, browsing and modifications. There is research on securing XML and XML schemas. The next step is securing RDF (Resource Description Framework). Now with RDF not only do we need secure XML, we also need security for the interpretations and semantics.

We also need to examine the inference problem for the Semantic Web. Inference is the process of posing queries and deducing new information. It becomes a problem when the deduced information is something the user is unauthorized to know. With the Semantic Web, and especially with data mining tools, one can make all kinds of inferences (Vimercati et al, 2009).

There are hardware issues also. From the very beginning the internet of things hardware has been the problem. The problem is with modern architecture of the chips made specifically for the IoT devices, the prices will go up making them expensive. Also the complex design will require more battery power which is definitely a challenge for IoT applications. Affordable wearable IoT devices will not use such chips meaning there is need for better approach (Singh, 2016).

While there are dozens of research in different aspects of security within Semantic Web applications in general and WSNs in particular, like the ones described by Chelli (2015), Thuraisingham (2003), Kagal et al. (2003), Scilla and Huhns (2002) and Medic and Golubovic (2010), there is still no integrative model which takes in consideration different segments of security within WSNs. In this research we aim to create a unique security model, which could be implemented anytime we need to deploy new WSN system. The idea is to firstly validate the model on WSNs for water quality monitoring and then in other domains. Finally, we will generalize the findings of the research, and make the model applicable in different stream reasoning domains.

## **2 AIMS OF THE RESEARCH**

The main aim of this research is to develop an integrative security model for stream reasoning systems in general and WSNs in particular. In our model, we will try to include at least these segments: secrecy, privacy, authentication, authorization, encryption and inference.

The research sub goals include security issues on data, semantic security and secure information integration, which are components of the secure Semantic Web and thus stream reasoning within WSN.

## **3 HYPOTHESES**

We have come up with two hypotheses which concern the quantitative part of the research, and two research questions for the qualitative part of the research.

Hypotheses:

- Creation of an integrative security model for stream reasoning systems in general and WSNs in particular will improve security in stream reasoning systems

- Current approaches to security within WSNs are isolated and not completely efficient for WSNs.

Research Question 1: Are current security foundations of Semantic Web also relevant for Stream Reasoning systems?

Research Question 2: Are current Semantic Web security measures valid for the data, ontologies and rules layer of the stream data applications?

## 4 RESEARCH METHODOLOGY

This research will employ mixed method approach. We will use qualitative methods when analyzing different findings on security within WSN, and we will use quantitative methods when we conduct observation and experimentation in the acquisition of new knowledge.

The model of the research will be organized with the following hierarchy of tasks:

### Task 1. Security models on Semantic Web applications

A research on Semantic Web security issues and privacy mechanisms will be done at this task.

### Task 2. Security aspects on WSNs

A research on main security aspects of WSNs will be done at this task.

### Task 3. Analysis of WSNs and DSMS security models

The works on this task will identify the appropriate security issues and mechanisms applicable on the domain of Stream Reasoning within WSNs

### Task 4. Build a valid and consistent security model for WSNs

This is the main thesis task. We will build a valid and consistent security model based on the best practices on Semantic Web and DSMSs, and outline specific security and privacy mechanisms for the domain of WSNs.

### Task 5. Validate the model on Stream Reasoning systems

The model built on Task 4 will be validated in another stream reasoning domain.

## 5 RESEARCH CONTRIBUTION

The design of a integrative security model for WSNs and stream reasoning systems will contribute on the community of Semantic Web and stream reasoning. Namely, our model can be a guide when deploying and maintaining WSNs in different contexts. The model will be validated on WSNs for water quality monitoring and other similar sensor networks.

We think it is very important to create an integrative security model for stream reasoning systems in general, and WSNs in particular, because that will improve security in stream reasoning systems. Secondary, this model will point out main segments which are most important in ensuring security in semantic stream reasoning systems, and their interrelationships.

Another contribution will be thorough analysis of current approaches to security. We intend to confirm that focusing on certain segment and overlooking other segments of

security contributes to semantic stream reasoning systems being vulnerable to security breaches. These analyses in turn should be an important part of the contribution.

As we intend to research if current security foundations of Semantic Web are also relevant for Stream Reasoning systems, we hope to come up with valuable findings in this direction too.

Both qualitative part and quantitative parts of the research should results with important findings, which should also contribute in future directions of research in security in semantic stream reasoning systems. The security model in itself should be an incentive for other researchers in creating other models to improve information security within semantic stream reasoning systems.

## **6 CONCLUSION**

This research will strive to create a integrative security model for stream reasoning systems and WSNs. In our model, we will try to include at least these segments: secrecy, privacy, authentication, authorization, encryption and inference.

The WSNs continue to grow and become widely used in many mission-critical applications. So, the need for security becomes vital. However, the wireless sensor network suffers from many constraints such as limited energy, processing capability, and storage capacity, as well as unreliable communication and unattended operation, etc (Chelli, 2015).

Traditional security models do not provide adequate protection in this dynamic and open environment that is WSNs. While there are significant efforts under way that should make WSNSs more secure, there is a lack of a model which takes into consideration all main aspects of security.

We hope to develop and implement a security model which has all main segments of security for stream reasoning systems, and which can be used when we deploy or need to maintain a WSN in different contexts. While creating this network we aim to evaluate authentication, access control, inferences, etc, and try to mitigate against such threats.



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# Systematic Literature Review of Security on Blockchain technology: Malicious Smart Contracts

Elva Leka<sup>1</sup>, Bernd Freisleben<sup>2</sup> and Luis Lamani<sup>3</sup>

<sup>1</sup> South East European University, Macedonia

<sup>2</sup> Philips-Universität Marburg, Germany <sup>3</sup>

Polytechnic University of Tirana, Albania

**Abstract.** Blockchain Technology has received extensive attention recently, but there is still a large number of technical challenges such as scalability and security. This paper helps to find where recent studies have been focused on and provides a taxonomy of common programming pitfalls which may lead to vulnerabilities of blockchain. In this Systematic Literature Review, we have performed deep analysis on smart contracts security vulnerabilities detection methods which will help to specify a future research. The study extracted 292 papers, most of which were found in IEEE, ACM and ScienceDirect digital libraries. After a detailed review process only 67 publications were considered based on defined inclusion and exclusion criteria. Out of these articles, the concerns, solutions and research gaps for the security on Blockchain were extracted.

**Keywords:** blockchain technology, smart contract, security.

## 1 Introduction

Blockchains are a digital technology that combine cryptographic, data management, networking, and incentive mechanisms to support the checking, execution, and recording of transactions between parties [1]. A blockchain ledger is a list ('chain') of groups ('blocks') of transactions. Blockchain serves a public ledger and transactions stored in blockchain are nearly impossible to tamper. Blockchain has the key characteristics such as decentralization, persistency, anonymity and auditability. Blockchain Technologies make decentralized consensus possible, i.e. agreement between untrusted players, without the need for central certification authority. Consensus is generated by cryptography-enabled algorithms running on a distributed network of peers and enabling (in the case of Bitcoin [2]) virtual currencies that do not depend on the existence of a central bank. More recently, Blockchain Technologies also support the decentralized execution of code, e.g. the Ethereum [3] blockchain, defining a new model of decentralized computation and enabling smart contracts.

An appealing feature of blockchain technology is smart contracts. A smart contract is executable code that runs on top of the blockchain to facilitate, execute and enforce an agreement between untrusted parties without the involvement of a trusted third party. In this paper, we conduct a systematic mapping study to collect all research that is relevant to smart contracts from a technical perspective. Compared to traditional contracts,

smart contracts do not rely on a trusted third party to operate, resulting in low transactions costs. There are different blockchain platforms that can be utilized to develop smart contracts, but the Ethereum is the most common one. The aim of doing so is to identify current research topics and open challenges for future studies blockchain technologies and mainly the studies that are focused on smart contract security.

From our literature review process, we believe that Blockchain technologies will be one of the next technologies revolutions and it has received extensive attentions recently, but there is still a large number of technical challenges such as scalability and security. We are focused at security of the Blockchain technology and identifying new possible security dangers. We also found that were identified very security problems related to ‘Malicious Smart Contracts’, so we can look at how we can improve this problem as a possibility for further study. We are learning towards that blockchain technologies is a very interesting research field, and we are focused at security of smart contracts and we can look at a specter of how we can improve security.

Blockchain help to improve efficiency and security. It could be applied into many fields including financial services, reputation system and public services. However, there are still a large number of technical challenges prohibiting the wide application of blockchain: scalability problem, privacy leakage etc. Structure of this paper will be as below: At section 2, background information about blockchain and smart contracts technologies. Section 3 describes the research methodology, Systematic mapping study that we have adopted. Section 4 presents information extraction, the results of searching and screening for relevant papers and results for classifying smart contract topics. Section 5 discusses the results and answers the research questions of the study.

## **2 Background and state-of-the-art**

Blockchain technology is designed to solve a number of well-known weaknesses of the internet. In the Blockchain Revolution, Tapscott [4] notes that by requiring all participants to use cryptography, the consequences of reckless behavior are limited to the individual who behaves recklessly, and that this redirection of responsibility potentially solves wide-ranging problems ranging from hacking to spam. While this idealistic view of blockchain technology is popular among enthusiasts, maintaining this view requires ignoring the increasing number of high profile exploitations of security vulnerabilities in smart contracts.

Blockchain is a sequence of blocks, which holds a complete list of transaction records like conventional public ledger [5].

Each block points to the immediately previous block via a reference that is essentially a hash value of the previous block called parent block. The first block of a blockchain is called genesis block which has no parent block. Each block consists of a set of transactions. Once a block is created and appended to the blockchain, the transactions in that block cannot be changed or reverted. This is to ensure the integrity of the transactions and to prevent double-spending problem.

A smart contract is a piece of software that stores rules for negotiating the terms of an agreement, automatically verifies fulfillment, and then executes the agreed terms [6].

The correct execution of smart contract is enforced without relying on a trusted authority. The popularity of this idea has been growing since the advent of Ethereum. Unfortunately, security bugs in smart contracts enable attackers to steal funds, and the pseudo-anonymity property of the blockchain, which although has mainly positive advantages, means that attackers can operate with minimal risk of repercussions [7]. For example, on June 17, 2016, what is now referred to as The DAO has since become synonymous with perhaps one of the greatest would-be heists of modern times. To the tune of \$55 million, an Ether thief discovered a bug in a smart contract that allowed repeated ATM-like withdrawals [8].

We can compare and contrast the existing verification and security tools.

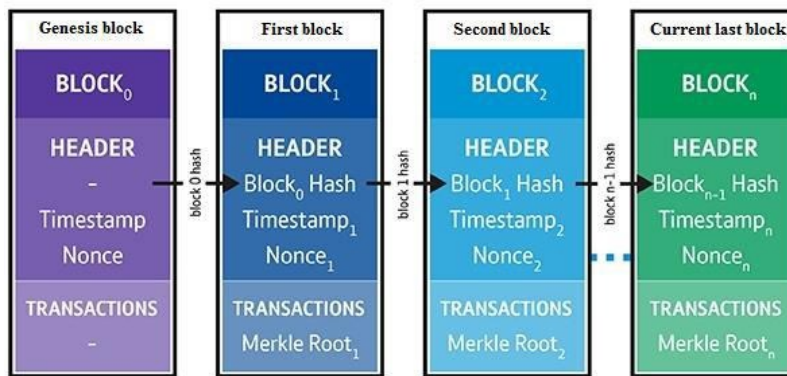


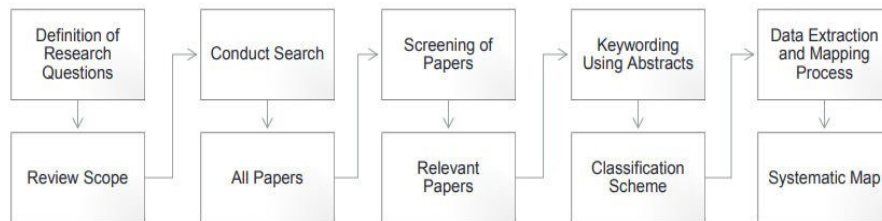
Fig.1. Blockchain [5].

### 3 Systematic review process

The construction of this review process is based on Peterson principle et al. [9], while also being channeled by other systematic literature review articles in the area of blockchain security and smart contracts. Systematic Literature Review provides a structure of the type of research reports and results that have been published by categorizing them. It often provides a visual summary, a map, of its results. A number of research questions must be defined in order to obtain these objectives in a systematic manner. The main goals of a structured mapping study are to present an overview of a certain research area and to identify research gaps.

Peterson et al. [9] propose 5 process steps when performing a systematic mapping study. In first step, the research questions and developed in order to define the scope. The next than is extracted and synthesized. In last phase the review results are obtained and the research questions are answered.

The results of this systematic mapping study [9,10] would allow us to identify and map research areas related to smart contracts. In addition, it would allow us to identify research gaps that need to be considered for future studies. The process for the systematic mapping study falls into five steps as it is shown at figure below.



**Fig. 2.** Selection process of primary studies.

### 3.1 Definition of research questions

In the way to identify as many primary studies as possible that are related to these research questions, the study carried a pilot search on some trustworthy database sources.

Research questions:

1. What are the current research topics in Blockchain Technology and Smart Contracts?
2. 1.1. Which are platforms that use the concept of smart contract?
3. Which are security vulnerabilities of Blockchain?
4. What kinds of research and contributions have been proposed by researchers and practitioners in order to detect threats/vulnerabilities?
5. How the publication has evolved over time?
6. What are the research gaps needed to be addressed in future studies?

### 3.2 Screening of papers for Inclusions and Exclusions

The search is carried out into a number of respected science sources, i.e. the IEEE

Computer Society, ACM Digital Library, Google Scholar, Science Direct, and Springer Link. Our focus was to only include high quality papers published in conferences, journals, workshops, symposiums and books. A total of 292 published papers in the domain were extracted. After a careful synthesis, and based on inclusion or exclusion criteria, 111 papers that are primarily focused on security in blockchain technologies and smart contracts were considered. We had a high number of excluded papers because many papers were irrelevant to our study. We excluded papers without full text availability; papers where the main language was not English; papers that had some other meaning than blockchain used in computer sciences. For instance, many papers discussed the topic from an economic or legal point of view. Some papers were excluded about cryptocurrencies point of view. 31 papers were removed as they were duplicates, resulting on 67. This section shows how the review process was conducted including activities such as question formularization, source selection, study selection process, information extraction and extraction execution.

### 3.3 Study selection

Before the extraction of articles from the identified sources was done, the method of inclusion and exclusion of articles based on the research questions was explained. The following are the criteria used in excluding or including a publication:

1. Initial selection for inclusion was based on whether the article title, abstract or introduction has a clear connection with the study.
2. The second stage excluded all articles that were irrelevant to our study based on their titles, papers without full text availability.
3. The third stage excluded those articles that had some other meaning than Blockchain used in computer science; we haven't taken in consideration financial part of blockchain or papers that the main focus were at cryptography.
4. The fourth stage excluded all duplicates papers.
5. The final stage included all primary studies related to the research questions.

## 4 Information Extraction

The data extraction form included information about the primary study itself as well as the information required to address the research questions. In order to gather the required information to address the objective of the study a data extraction form is designed. The full paper was read to collect the required data, and the following information have been extracted from each paper: source, authors, title, publication year and research questions answers: and information required to classify the study.

### 4.1 Research type

The research type is based on the schema proposed by Wieringa et. al [8]. This facet has six categories. The keywords used to classify the papers into these categories are listed in Table 1.

**Table 1.** Keywords for research type

<b>Validation Method Research Type</b>	<b>Keywords</b>
Validation research	Test, result, simulation, analysis, experiment, prototype
Evaluation research	Evaluation, implementation, result, platform, case study, production
Solution proposal	Solution, proposal
Philosophical paper	philosophical paper
Opinion paper	Discuss, survey, suggests
Experience paper	Experimental

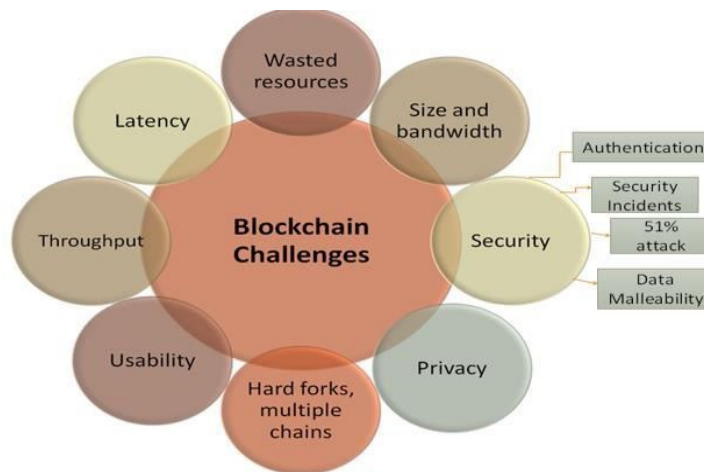


## 4.2 Classification results

At this section we will make classification results and also answer to the first research question which was:

*RQ. 1.* What research topic have been addressed in current research on Blockchain technology?

We made some different classification schemes relating to papers we read. The first classification was focused on paper type. We classified them into three categories: (1) blockchain report, (2) blockchain improvement, (3) blockchain application. Our main focus was at the blockchain challenges to the future. We found that the most of the papers fall into smart contract issues category. They were mainly focused at codifying, security, privacy and performance issues. Codifying issues mean challenges that are related to the development of smart contracts [11]. Security issues mean bugs or vulnerabilities that an adversary might utilize to launch an attack. Privacy issues mean issues related to disclosing contracts information to the public. Performance issues mean issues that affect the ability of blockchain systems to scale [12].



**Fig. 3.** Blockchain challenges.

At figure 4. is presented a classification scheme [13] related to smart contracts where the categories are: (1) security issues, (2) smart contract application, (3) Platforms, (4) Usage of Smart Contracts, (5) Design Patterns.

*RQ1.1* Which are platforms that uses the concept of Smart Contracts?

Analyzing the papers, we found that two of most prominent platforms that use the concept of Smart Contract were Ethereum and Bitcoin. But at some papers were mentioned some other platforms that use smart contracts such as: Codius [14], Counterparty [15], DAML [16], Dogearty [17], Lisk [18], Monax [19], Rootstock [20], Symbiont [21], Stellar [22].

We will be focused mainly at Ethereum Smart Contracts, since the source code of Ethereum contracts is open so it allows us to analyze the most common design patterns adopted when writing smart contracts.

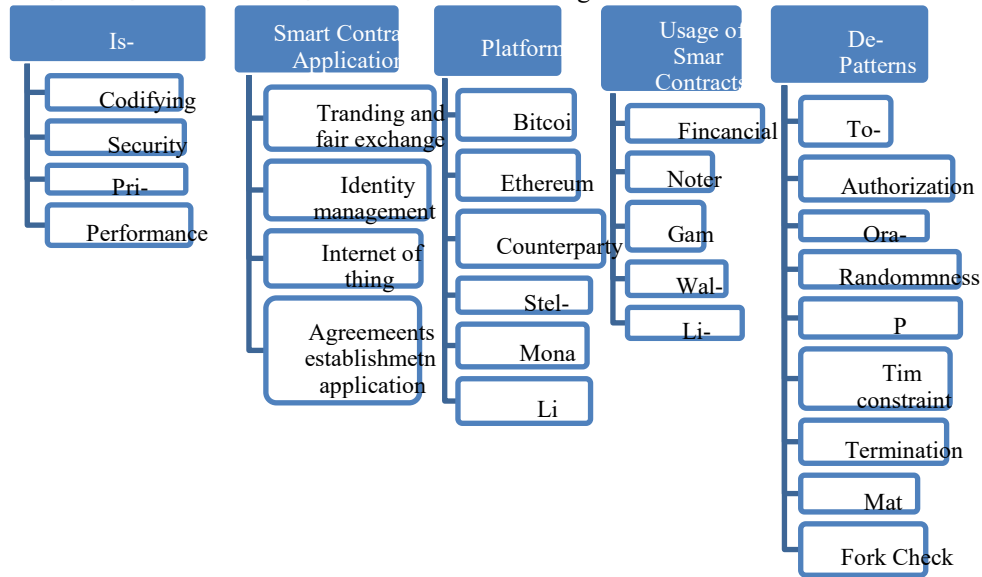


Fig. 4. Classification scheme related to smart contracts.

## 5 Results

At this section we will see the results of the systematic literature review. We analyzed the first research question at section above.

*RQ.2. Which are the security vulnerabilities of Blockchain and Smart Contract?.*

Blockchain is eons beyond competing database architectures in terms of keeping data secure, but we noticed that blockchain security risks do exists. Some of the most common vulnerabilities are: endpoint vulnerabilities, public and private key security, blockchain integration platforms, untested at full scale, lack of standards and regulation, untested code (an example of this vulnerability is DAO attack) and vulnerabilities on smart contracts. We should be concerned about smart contracts because there is increasing evidence that perhaps greater than 40 percent, of Ethereum smart contracts are vulnerable. According to a short selection of research papers that characterize some of the most serious vulnerabilities we are highlighting just some of them.

On June 17, 2016, what is now referred to as The DAO [23,36] has since become synonymous with perhaps one of the greatest would-be heists of modern times. To the tune of \$55 million, an Ether thief discovered a bug in a smart contract that allowed repeated ATM-like withdrawals.

On June 20, 2017, a vulnerability in Parity’s multi signature wallet was exploited by hackers. More than 150,000 ether tokens, worth around \$32 million were stolen by cybercriminals. In this case, some Solidity primitives have the non-obvious side effect of invoking the fallback function of the recipient. This can lead to unexpected behavior and may be exploitable by an attacker [24,37,38].

Authors et al. [25], both malicious miners and users can exploit certain classes of vulnerabilities that the authors deem to be to a “semantic gap” between how the developer thinks code executes versus how it actually does. In their study, 8519 out of 19366 (44%) Ethereum smart contracts contained “semantic gap” vulnerabilities, involving a total balance of over 6 million ETH (ether tokens).

According to [26] the authors translate Solidity to F\* to analyze EVM bytecode. They perform checks to capture whether the code undoes side effects that can persist when a call to send () fails, and also to detect the reentrancy problem that plagued the DAO. The limitations of their tool restrict analysis to only 46 smart contracts; however, the authors state that of those only a handful passed their checks, suggesting that “a large-scale analysis of published contracts would likely uncover widespread vulnerabilities.

Peterson et al. [27] taking in consideration that three classes of errors are highlighted that are common in smart contracts: unexpected states, failure to use cryptography, and full call stack. They propose using dependent and polymorphic types and a functional language called Idris to make smart contract development safer.

*RQ. 3. What kinds of research and contributions have been proposed by researchers and practitioners in order to detect vulnerabilities at smart contracts?.*

The blockchain implementation of a smart contract is a computer program whose correct execution is enforced without relying on a trusted authority. The popularity of this idea has been growing since the advent of Ethereum. Unfortunately, security bugs in smart contracts enable attackers to steal funds, and the pseudo-anonymity property of the blockchain, which although has mainly positive advantages, means that attackers can operate with minimal risk of repercussions [28].

We can compare and contrast the existing verification and security tools

According authors et al. [29], although analysis and verification tools may help in detection of vulnerabilities the choice of using a Turing-complete, human readable language could overcome this issue, at least in some specific application domains. Some recent works propose tools to detect vulnerabilities through static analysis of the contract code.

The authors et al. [9] propose the Oyente tool, which extracts the control flow graph from the EVM bytecode of a contract, and symbolically executes it in order to detect some vulnerability patterns. In particular, the tool considers the patterns leading to vulnerabilities of kind “exception disorder” (e.g., using block timestamps in conditional expressions), “unpredictable state” and “reentrancy”.

Quantstamp [30] ensures that all audited smart contracts conform to a security standard. To improve the blockchain infrastructure they implemented a decentralized security protocol. Their approach offers two core advantages: 1) the decentralized design

allows end-users to directly verify programs without relying on reputation; Verified smart contracts are tagged with the version of the security library used by the verifier; Independent verifiers are incentivized to scan the network for uncaught vulnerabilities, and developers are responsible to address vulnerabilities when they are found; 2) They incentivize miners by making the verification and certification of smart contract part of the mathematical problem that a miner needs to solve [30].

The tool presented in [26] translates smart contracts, either solidity or EVM bytecode, into the functional language F\*. Various properties are then verified on the resulting F\* code. In particular, code obtained from Solidity contracts is checked against “exception confusion” and “reentrancy” vulnerabilities, by looking for specific patterns. Code obtained from EVM supports low-level analyses, like e.g. computing bounds on the gas consumptions of contract functions. Furthermore, given a Solidity program and an alleged compilation of it into EVM bytecode, the tool verifies that the two pieces of code have equivalent behaviors.

Both tools have been experimented on the contracts published in blockchain of Ethereum. The results of this large-scale analysis show that security vulnerabilities are widespread. For instance [30] reports that 28% of the analyzed contract potentially contain “exception disorder” vulnerabilities.

Authors at al. [31] use the Isabelle/HOL proof assistant to verify a specific contract. More precisely, the target of the analysis is the EVM bytecode obtained by compiling the Solidity code of “Deed”, a contract which is part of the Ethereum Name service. The theorem proved through Isabelle/HOL states that, upon an invocation of the contract, only its owner can decrease the balance.

The Ethereum protocol supports stateful contracts, meaning that the values of state variables persist across multiple invocations. A contract is invoked when it receives transactions from users at its unique address. If such transactions are accepted by the blockchain, all participants of the miming network execute the contract code. The network then agrees, by the consensus protocol, on the output and next state of the contract. Given that Ethereum smart contracts are immutable and the effects of the transactions cannot be reversed, it is clearly essential to be able to reason effectively about code prior to deployment [30,32,34].

#### *RQ. 4. How the publication has evolved over time?*

. All selected papers were published after the year 2012. This shows that Blockchain as a research area is a very recent new one. When looking at the publication year distribution more closely, out of all the selected papers: 2 papers (3%), were published in 2013, 6 papers (9%) were published in 2014, 11 papers (16.4%), in 2015, 25 papers (37.3%) in 2016, and 23 (34.3 %) in 2017.

#### *RQ. 5. What are the research gaps related to be addressed in future works*

After we did the Systematic Mapping Study, we found the gaps mainly focused on scalability and performance issues. There is a lack of standard and regulation. Future research might investigate different implementation of blockchain to deploy and run secure smart contract, such as developing a tool that implement a decentralized security protocol to detect vulnerabilities to blockchain and smart contract.

Smart contracts have the potential to radically change the way we interact and transact with each other. But smart contracts require a different development process than traditional software development, so there are number of things to be achieved before we transfer the control of high-value assets to pieces of code running on a set of distributed computers. In this area additional developments are needed for the creation of robust and secure smart contracts.

## 6 Conclusions

In this paper, we focus on the security issues of blockchain technology and smart contracts. Based on the above systematic literature we conduct an examination of blockchain vulnerabilities, security issues and risks. Smart Contract Security Vulnerabilities were mainly related to: problematic language design, smart contract specific vulnerabilities, traditional language vulnerabilities and inherently dangerous methods. According researchers we noticed that there was an increasing interest in implementing secure smart contracts.

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# Analysis and comparison of SLA algorithms in a multicloud environment

<sup>1</sup>Merita Kasa Halili <sup>2</sup>Betim Cico

South East European University, Tetovo 1200, FYROM  
Epoka University, Tirana, Albania

**Abstract.** Cloud computing is a paradigm that enables instant access to multiple resources of Information technology through its models Software as a Service (SaaS), Platform as a Service (PaaS) and infrastructure as a Service (IaaS). Service Level Agreement (SLA) is a document that comprises a description of the service, service level parameters, guarantees, and actions for all cases approved. The SLA is very significant as a control among consumer and provider for any violation for the agreement. To overcome the various problems that arise in the cloud, there exist a large number of SLA algorithms that help improve the various cloud parameters challenges. The aim of this paper is to review different SLA algorithms proposed by various researchers. We discuss about the various challenges in which the mentioned algorithms act in their improvement. In this paper we discuss the advantages and limitations of current algorithms with the help of a table. Then we propose our possible future work and at the end we summarize and provide conclusion.

**Keywords:** Cloud computing, SLA, Algorithms, SaaS, PaaS, IaaS.

## 1 Introduction

Cloud computing needs are growing proportionally to the exponential distribution of large amount of data in virtually all technical and scientific areas. Hence, access to a cloud computing environment requires the provision of on-demand transparent services to clients. Even though the cloud grants an abstraction of the role of the service providers in the underpinning by including the logical and physical resources, it remains a challenge to fully adhere with the SLAs (Service Level Agreements), because, depending on the service demand and system structure, the providers might not fulfill the necessary requests of the customers. In addition, the enterprises and researchers are seeking for a mechanism and framework that monitors and executes the load balancing design of algorithms and breakthrough with the available resources. Figure 1 represents how the cloud environment functions and the role of SLA on within the structure.

Cloud computing environment is composed from the following elements: Cloud resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. Software as a Service (SaaS) model provides access to application software and databases. Platform as a Service (PaaS) vendors offer a



development environment to application developers. Infrastructure as a Service (IaaS) model refers to online services that provide high-level APIs like physical computing resources, location, data partitioning, scaling, security, backup etc.

Service provider is a company that delivers cloud computing based services and solutions to businesses and/or individuals.

Service consumer is an organization (or a human) that has a formal contract or arrangement with a cloud provider to use IT resources made available by the cloud provider.

Service level agreement document (SLA) is a commitment between a service provider and a client. Particular aspects of the service – quality, availability, responsibilities – are agreed between the service provider and the service user.

Service guarantee means any consultant, agent, advisor, or independent contractor who renders services to the Company.

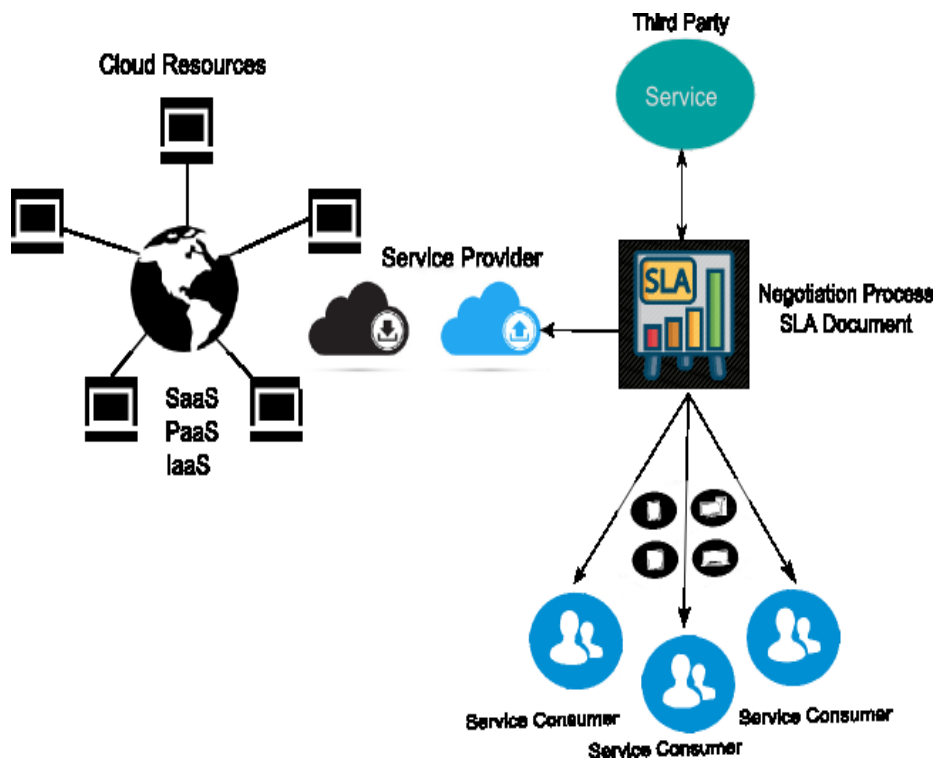


Fig. 1. Cloud computing environment

To reach all the foreseen points of a SLA, it is necessary that these agreements be created with specific lines of margins and as well as the two parties such as cloud provider and cloud user who participate should have regular communication meetings.

Awards and costs have to be securely charged, but in most cases in every SLA is left space for annual re-evaluation in case of interference if there is any change. Cloud computing also collects various resources, which is sustained by the essential nature of a shared infrastructure environment [1].

The contribution of this paper is the analysis and comparison of SLA algorithms, their advantages and limitations by indicating several parameters useful for the multi cloud environment.

The rest of this paper is structured as follows: in Section 2 is presented a review of SLA algorithms in cloud computing; Section 3 consists of analyzes through a table by comparing the parameters that are addressed by the algorithms mentioned in the research with the aim of improving the cloud infrastructure, SLA violation, customer satisfaction level and increasing the income of the cloud providers; in Section 4 we have presented the research gap for our future work and finally, Section 5 draws conclusions and perspectives.

## **2 SLA algorithms in cloud computing – Review**

Considering the spread of the Cloud Computing environment the appearance of many cloud challenges such as selecting the perfect cloud set-up, real-time monitoring requirements, dependency on service providers, in many cases have become usual. As a result of these challenges it comes to breach of earlier agreed rules in a SLA by the cloud service provider and the cloud service user.

To overcome the various failures that appear from time to time there have been presented many algorithms that have contributed in many aspects like minimizing SLA violation, improving the response time, minimizing costs by minimizing the resources. In this section we will discuss about SLA algorithms that have been presented in different research papers.

Linlin Wu et, al. [2] in their work introduce resource allocation algorithms in the level of Software as a Service (SaaS) providers who tend to minimize infrastructure cost and SLA violations. The authors of this paper address different parameters of QoS (Quality of Service) such as response time, and infrastructure level parameters such as service initiation time. They also describe a comprehensive evaluation study to inspect and exhibit that the proposed algorithms minimize the SaaS provider's cost and the number of SLA violations in a dynamic resource partaking Cloud environment. Moreover, unlike the previous, in their next work [3] they also consider the customers profile. This time they propose customer driven SLA-based resource provisioning algorithms to minimize cost by minimizing resource and penalty cost and improve CSL (Customer Satisfaction Level) by reducing SLA violations. The accent of the proposed provisioning algorithms lay on the customer profiles and providers' quality parameters (response time) to deal with dynamic customer requests and infrastructure level diversity for enterprise systems. They also consider the customer-side parameters (such as the proportion of upgrade requests), and infrastructure-level parameters (such as the service initiation time), with the aim to compare algorithms. The results of the simulation indicate that their algorithms minimize the total cost up to 54% and the number of SLA

violations up to 45%, compared with the previously proposed best algorithms. Evelina Lammana et, al. [4] propose an alternative method for operating the outline phase of the SLA algorithm. They specify a new methodology by using data mining techniques, and in thorough the computation of a number of parameters usually interpreted in affiliation to association rules, with consequence to acknowledge a introductory structure of a Bayesian network. Association rules outline parallelism of occurrence, and can be seen as probabilistic paradigms. Two events are correlated if they are often observed jointly. Each association rule, is distinguished by assorted parameters which can be practiced in structure learning. They determine the BNL-rules algorithm (Bayesian Network Learner with association rules) that enforces these parameters to assume the structure of a bayesian network.

Zhou Zhou et, al. [5] have been focused in the aspect of the high energy consumption due to large-scale data centers. They have made their research on the basis of the ATEA algorithm. They propose a novel VM (Virtual Machine) deployment algorithm (ATEA), two kinds of adaptive three-threshold algorithm and three kinds of VMs selection rules.

The experimental results specify that the projected algorithms efficiently minimize energy consumption and SLA violation. Mehdi Alasti, et, al. [6] propose a based scheduling algorithm for wireless networks. They contemplate a time-slotted system where the parameter of QoS (time) is the resource to be allocated among all mobile users by a key processor. In addition, their work conveys the scheduling algorithms to afford high network throughput, support QoS and SLA violation, even under massive network loads, and produce high income for service provider.

Yali Zhao et, al. [7] consider the area of Big Data Analytic applications. According to the authors it is necessary to have a general Analytics as a Service (AaaS) platform that can supply BDAAAs (Big Data Analytic Applications) to users in several disciplines as consumable services in an easy to use manner and at lower price. For supporting the AaaS platform they dictate their research on efficiently scheduling Cloud resources for BDAAAs to satisfy Quality of Service (QoS) requirements of budget and deadline parameters for data analytic requests and maximize profit for the AaaS platform. They propose a designation mastery and resource scheduling algorithm, which will satisfy QoS requirements of requests as made certain in SLAs, moreover, it increases the profit for AaaS providers by providing a cost effective resource scheduling elucidation. They also include the frameworks and models for the AaaS platform and perform case studies to measure the specified algorithm. The outcome of the research explains the ability of the algorithm in SLA guarantee, profit enhancement, and saving in cost.

Leonildo J. de M. de Azevedo et, al. [8] are focused on improving the Quality of Service (QoS). They propose algorithms to specify the commitment to optimize in cases when handling computational resources before formulating the SLA. The above mentioned authors represent two optimization algorithms tending to overcome the highlighted gaps. Initially, they address the problem to solution space by including deterministic algorithm that is able to search thoroughly. The microGenetic Algorithm ( $\mu$ GA) is projected with intention to seek more easily the space solution. As an outcome to the research these algorithms determine a clarification for the enormous resources

that could be expandable and also outlined some of the QoS attributes that specify the benchmark for the SLA.

Rajkumar Rajavel et, al. [9] their work is focused on developing the customer satisfaction level (CSL), or expanding the ability to satisfy enterprise customers to gain customer loyalty, which is the critical determinant of the success in driving sales and expanding the business. Aiming to resolve this issue they have been focused to the response time parameter. They use an innovative hierarchical arranging job prioritization to give more priority for deadline related tasks. This approach will please the service consumer and fulfill the SLA by increasing the attributes of the scheduling algorithm.

Mohammad Ali Khoshkholghi et, al. [10] propose an energy efficient algorithms which tend to advance the overall of computing resources and minimize energy consumption under SLA constraints regarding several computing devices such as: CPU, RAM, and bandwidth. The completeness of the specified algorithms is confirmed by indicating thorough case study simulations. As a conclusion the results of the evaluation apparently display that the proposed algorithms notably minimize energy consumption while offering a high level of assurance to the SLA. According this research, energy consumption can be reduced by up to 28%, and SLA can be improved up to 87% when in comparison with the standard algorithms.

In competitive cloud market the service provider should select an optimal penalty policy to achieve the maximum profits. In [11] they initially study the methods for sanction computations of cloud service providers. According to the analysis of their paper, they focus on increasing the profitability of cloud service providers by utilizing a mechanism based on corresponding penalties and a competitive penalty approach. Based on the above-mentioned research every cloud provider is required to choose the better fit penalty policy with the intention to maximize the profit. According to the above mentioned papers, we were able to monitor several algorithms for improving the SLAs by including particular QoS parameters. In the next section, we will focus on analyzing and comparing these algorithms in different levels.

### **3 Analysis of SLA algorithms**

In this section we will convey analysis of the above mentioned algorithms. The analysis will be done through the following table by comparing the parameters that are addressed by the algorithms mentioned in the research with the aim of improving the cloud infrastructure, SLA violation, customer satisfaction level and increasing the income of the cloud providers.

In the table 1 we have highlighted the paper reference mapped with the proposed algorithms. We have compared and analyzed 8 SLA algorithms, where most of them focus Infrastructure cost, customer cost, SLA violation, energy consumption, network throughput, profit, QoS and customer response time

**Table 1.** SLA algorithm analysis

<b>Paper reference</b>	<b>Proposed algorithms</b>	<b>Algorithm objectives</b>	<b>Infrastructure level parameters</b>	<b>SLA violation</b>	<b>Customer satisfaction level</b>	<b>Profit</b>
[2]	Resource allocation algorithm for SaaS	Infrastructure cost, SLA violation	Quick service initiation time	Minimize	Improves response time	-
[3]	Customer driven SLA based resource provisioning algorithm	Customer cost, SLA violation	Quick service initiation time	Minimize	Minimize cost by minimizing resources	-
[5]	Novel VM deployment algorithm-ATEA	SLA violation energy consumption	Reduce energy consumption	Minimize	-	-
[6]	Based scheduling algorithm for wireless networks	Network throughput, QoS, SLA violation	High network throughput	Support SLA violation	Support QoS	High income
[7]	Admission control and resource scheduling algorithm	Profit, QoS	-	-	Increase the QoS	Increase the profit for Analytics as a SP
[8]	Optimization algorithms	QoS	-	-	Improve QoS	-
[9]	Hierarchical Scheduling algorithm	Customer response time	-	-	Improve response time	-
[10]	Energy efficiency Algorithm	Energy consumption	Reduce energy consumption up to 28%	Improve SLA up to 87%	-	-
[11]	Competitive Penalty model and penalty based profit maximization Algorithm for cloud providers.	SLA availability, penalty degree	High availability	Competitive penalty model	High	Maximize

## 4 Research Gap

In our previous work [12], we have performed an overview of novel formalization of SLA between the cloud user and cloud provider in multi-cloud environment; more specifically we have reviewed 126 papers related to this field.

The research aims to propose a novel formalization of service level agreements between the cloud user and cloud provider in multi-cloud environment by analyzing, comparing or improving the algorithms used for SLAs, also without limiting the possibility for modifying an existing algorithm.

The idea is to improve the performance of existing implementations, like identifying the SLA violations and implementing comprehensive monitoring.

In addition, for our future work we would focus in comparison of existing algorithms, their improvement, or the realization of a self-adaptive algorithm that based on the quality control of the agreement will ensure automatic prediction of the changes that would appear in the accorded SLA between the cloud provider and cloud user.

## 5 Conclusion

In this work, we have conducted a survey in regard to SLA algorithms by analyzing related in-depth analysis of related papers and the possibilities to minimize infrastructure costs in multi-cloud environments and meet cloud clients requirements. In addition, we have monitored and explained the importance of QoS (Quality of Service) parameters in regard to requirements of budget and deadline for data analytic requests and maximize profit where the cloud providers and consumers would meet expectations.

Moreover, we have indicated a comparison table of parameters specified in different workloads, aiming to improve the cloud infrastructure, the common issue of SLA violations and matching the requirements of service clients.

We have proposed the analysis of algorithms in the level of Profit, customer satisfaction level, algorithms objectives and more.

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# Linguistics, Education, Literature & Translation



# Pronoun encliticisation in Massa<sup>1</sup>

Guillaume Guitang

University of Buca, Buca, Cameroon

**Abstract.** In this paper, we examine the process of personal pronoun encliticisation in Massa. Contrary to Melis (1999) and Ousmanou (2007) who postulate two forms of the personal pronoun (disjoined and conjoined forms), we argue that Massa has only one set of personal pronouns namely, the conjoined forms. These are shown to encliticise leftward to the closet constituent within their Clitic group considered here to be the phrasal domain. The disjoined forms are shown to derive from a PF process of consonant insertion fed by the absence of a valid host for encliticisation to take place. In order to account for apparent exceptions to our analysis (objects reordering, anaphoric demonstratives and focus movement), we assume that the operation Merge is a dynamic process which takes successive chunks of structures to the PF component where morpho-phonological processes (here: pronoun encliticisation, consonant epenthesis etc.) occur.

**Keywords:** Key words: personal pronoun, encliticisation, PF component.

## 1 Introduction

Personal pronouns in Massa have often been grouped into two forms: the full versus the reduced forms (following Melis, 1999) or the disjoined or conjoined forms (following Ousmanou, 2007). The two forms are presented in (table 1) below taken from Ousmanou (2007, p. 45).

**Table 1.** Massa personal pronouns

Person/number	Full/disjoined forms	Reduced/conjoined forms
1 pers. sing.	nan(u)	-an(u)
2 pers. sing. masc.	nanj(u)	-anj(u)
2 pers. sing. fem.	nag(u)	-ag(u)

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<sup>1</sup> The Massa language is mainly spoken in Cameroon and in Chad along the two banks of the Logone River. While speakers in Cameroon have mainly settled along the Logone in the Mayo-Danay division, those in Chad occupy a large area stretching from Bongor (main town of the Mayo-Boney division) to Guelendeng (Melis 1999). The lack of updated population data in both countries makes it difficult to know the number of speakers of the language. However, Lewis, Simons and Fennig (2016) estimate the number of speakers to 295,000 (with 192,000 in Chad).

3 pers. sing. masc.	nam(u)	-am(u)
3 pers. sing. fem.	naʔ(a)	-aʔ(a)
1 pers. plu. inclu.	naj(a)	-aj(a)
1 pers. plu. exclu.	numaʔ(a)	-umaʔ(a)
2 pers. plu.	nigij(a)	-igij(a)
3. pers. plu.	nizij(a)	-izij(a)

The occurrence of each of these forms is generally conditioned by the morphosyntax of the language as indicated by Ousmanou (2007): “Ainsi, le pronom personnel va changer de forme selon qu’il est déterminé ou seul, ou déterminant d’une autre catégorie grammaticale” (p. 45). According to Ousmanou (2007) thus, the so-called full forms constitute an unbound class which occur either in isolation or as phrasal heads while the reduced forms constitute a bound class that are always suffixed and occur as modifiers. However, a careful look at the forms in (table 1) permits one to observe that the only difference between them lies at their beginnings. While all the conjoined forms are suffixal, the disjoint forms all begin with the same consonant and the remaining material is exactly the same as with the conjoined forms. In classical phonological analysis, this would be clear indication that the initial consonant in the disjoint forms is actually an epenthetic consonant or that the conjoined forms have lost (deletion) that consonant. Following Caïtucoli (1983), Ousmanou (2007) suggests that the disjoint forms be analysed as a combination of the specifier – na and the conjoined forms in (table 1). Thus, the first person singular disjoint form would be analyzed as shown in (1) below:

$$(1) \text{ na} + \text{-an(u)} \rightarrow \text{n-an(u)}$$

Where the specifier final vowel is deleted following an active rule in the language which forbids contiguous vowels across morpheme boundary.

While this sounds appealing, it does not go without problems. First, the epenthetic consonant which is n- in the Yagwa variety described by Ousmanou (2007) is not the same in other varieties of the Massa language. In the Haara dialect described by Melis (1999), the epenthetic consonant is instead the voiceless glottal stop ʔ as shown in (table 2) below:

**Table 2.** Massa personal pronouns: Haara dialect

Person/number	Full/disjoined forms
1 pers. sing.	ʔ-an(u)
2 pers. sing. masc.	ʔ-aŋ(u)
2 pers. sing. fem.	ʔ-ag(u)
3 pers. sing. masc.	ʔ-am(u)
3 pers. sing. fem.	ʔ-aʔ(a)
1 pers. plu. inclu.	ʔ-aj(a)

1 pers. plu. exclu.	ʔ-umaʔ(a)
2 pers. plu.	ʔ-igij(a)
3. pers. plu.	ʔ-izij(a)

If Ousmanou's (2007) claim was correct, we would also expect the specifier in the Haara dialect to be something like ʔa which combines with the conjoined forms as shown in (1). Unfortunately, Haara also uses the specifier na, thereby indicating that it cannot be it combining with the disjoined forms, in which case we would find the same consonant in both dialects.

A second problem relates to the nature of the specifier –na itself. It can be seen that this morpheme is suffixal in nature. In fact, the specifier in Massa is always suffixed to the nominal element it determines as seen in (2):

- (2) ʃɛn-na v-an-u thing-Spec. jonct-  
 1Pers.sing-FV  
 “My things”

It therefore sounds very odd to assume that this specifier changes from being a suffixal item to a prefixal one only to discriminate between the conjoined and the disjoined forms especially as this process is not operative elsewhere in the language.

Ousmanou (2007) himself recognises this oddity in the following lines: « ... l'agglutination du déterminant –na et des marques de personne/nombre est d'un type particulier puisque aucun de ces éléments constitutifs n'est un lexème. Tous sont des morphèmes utilisés par ailleurs en tant qu'affixes » (p. 57).

Contrary to this claim made by Caïtucoli (1983) and Ousmanou (2007), we want to argue that the initial consonant of the disjoined form is a default consonant inserted to give prosodic independence to the personal pronoun which we will also be arguing is enclitic in nature. But before we discuss this process, we will start by describing pronoun encliticisation in Massa. Crucial to the point of view developed here is that Massa only has one form of personal pronouns, the reduced/conjoined forms and that these personal pronouns are enclitic in nature.

## 2 Pronoun encliticisation: evidence that there is just one set of pronouns

The hypothesis we develop here derives directly from the discussion we have done so far. By postulating two sets of personal pronouns, Melis (1999) and Ousmanou (2007) unnecessarily makes the Massa grammar cumbersome and they fail to capture the psychological reality (based on native speaker intuition) that the two forms are the same with the difference that an epenthetic consonant is realised at the beginning of the disjoined forms. One important thing to note about the realisation of these two forms is that while the conjoined forms are always realised as suffixes to various constituents, the disjoined forms on their part are always elicited either in isolation or in the subject position thereby suggesting that their occurrences are morphosyntactically conditioned.

Our hypothesis to explain why the disjoined forms came to be relates to the process of reduced personal pronouns suffixation discussed in Melis (1999) and Ousmanou

(2007). According to these authors, the conjoined form of the personal pronouns is always suffixed to a preceding head. This observation can be formalised as in (3):

(3) A suffixal pronoun encliticises leftward on the preceding head

The application of this rule is shown in the following examples where the different personal pronouns encliticise on various clausal or phrasal elements.

(4) a. naʔ ʃ-umu

She kill-3Pers. sing.

“She killed it”

b. Noyona dav-an

hiw-

na

Noyona Prepare-1Pers. Sing meat-Spec.

“Noyona prepares me meat”

c. nam maj kud-anu

He come with-1Pers. sing

“He came with me”

d. zii-da v-umaʔa

House-Spec. Jonct.-1Pers.plu. exclu

“our house”

In (4a) and (4b), the object personal pronouns are seen to encliticise on the verb they complement. In (4b), the direct object *hiw-na* is not pronominal, so it does not encliticise. The indirect object *-an* on its part by virtue of being pronominal, docks onto the head verb. Note in this direction that the canonical order of elements is altered. In this language, when the direct object and the indirect object are not personal pronouns, the direct object precedes the indirect object. If the two are personal pronouns or when only the indirect object is, the indirect object is placed/suffixed before the direct object. We shall attempt an explanation of this reordering subsequently and especially why the personal pronoun does not encliticise on the preceding item *hiw-na*. In (4c), the personal pronoun is suffixed to the preposition *kud*, the head of that prepositional phrase. In (4d) which is a possessive construction, the personal pronoun

*-umaʔa* is seen to encliticise to the preceding junctor (possessive marker) *vi*. All of these facts, except for (4b) indicate that the process of personal pronoun encliticisation is local as personal pronouns encliticise on the closest constituent on the left within their clitic group, providing additional support in favour of the so-called Locality Principle which stipulates that “grammatical operations are local” (Radford, 2009).

Now, if we assume that there is only one form of personal pronoun, how do we account for the presence of the disjoined forms?

Our hypothesis is that, the disjoined forms are the result of an independent rule which is applied to guarantee prosodic independence (???) to a disjoined form that was not able to encliticise. This simply proceeds from the observation that the personal pronoun encliticisation process is local and that it requires the presence of a preceding constituent within its clitic group on which the personal pronoun is encliticised. To put this on concrete footing, consider the following sentence taken from Melis (1999, p. 182):

(5) naʔ vul-um mi juf-aʔa

3pers.Sing.fem give-3pers.sing.masc.to husband-  
3pers.sing.fem.

"She gave it to her husband"

As expected, the two complement personal pronoun –um (complement of the verb vul) and -aʔa (complement of the noun juf), following the rule in 3 and the locality of pronoun encliticisation (PE) docks unto the closest heads to their left. The subject personal pronoun which we take to be -aʔ (conjoined form) fails to encliticise since there is no available host to its left. In order for it to gain prosodic independence or bleed its suffixal nature, the consonant n- is inserted. A rule for this could be stated as (6):

- (6) If PE fails, insert n- (or ʔ-) to make a personal pronoun prosodically independent.

Note that we treat the n-insertion here as a purely phonological phenomenon relating a certain phonotactic constraint (6) which requires that suffixal personal pronouns that lack a valid available host be "covered" by an epenthetic consonant in order to be prosodically independent. If this is the case then we need not postulate a second class (disjoined) of personal pronouns which as we have seen can be derived by applying the rule in (6) when conditions to apply the one in (3) are not met.

Facts from subject focus in Massa discussed by Melis (1999) would seem to contradict our analysis. In a structure like the one in (7) one would normally expect the subject personal pronoun –anu to encliticise on kejn which seems to be an available host but instead, it surfaces in its full form.

- (7) law- keyn n-anu  
Speak-3Pers.sing.fem. Dem. EC-1Pers.sing.  
"It is I who spoke to you"

The structure in (7) illustrates the process of structural focus in Massa described by Biloa (2014) which involves the leftward extraction of the focussed constituent from Spec. TP to Spec. Foc. P and a remnant TP movement to the left of Force P as shown in (8) below:

- (8) [ForceP [Spec.n-anu law-ak]j [Force] [CleftP [Cleft kejn] [FocP  
[Spec.nanui]  
[Foc] [TP [Spec. nanui] [T] [VP [V law] [N –ak] ] ]j]]]

We can explain the non-encliticisation of –anu by saying that the rule in (6) applies before its extraction is done, making it prosodically independent before merge with the Cleft Phrase and in this way blocking encliticisation. It could also be said that encliticisation is not possible because kejn and –anu are not in the same clitic group (which is the case). Kejn, being the head of the Cleft Phrase selects as complement the whole Focus Phrase where –anu occupies the specifier position. Thus, the necessary conditions (locality, head-complement relation) for (3) (PE) to apply are not met.

### 3 Pronoun encliticisation and object ordering

Object personal pronouns, as we have seen, encliticise on the verbs they complement following the rule in (3). We also saw that the canonical order within the VP which is V + DO + IO is changed to V + IO + DO if the indirect object is a personal pronoun or if both objects are personal pronouns. This would mean that indirect object encliticises before the direct object. But how come this is possible given that the direct object generally precedes the indirect object when both are full NPs? An answer to this question may come from considering the structure building operation Merge as a dynamic operation which combines constituents and take successive chunks of structures to LF and PF for interpretation. Crucial to this analysis is the notion of Prolific Domain propounded by Grohmann (2004) which we transcribe below:

(9) Prolific Domain

A Prolific Domain is a contextually defined part of the computational system,  
i. which provides the interfaces with the information relevant to the context and ii.  
which consists of internal structure, interacting with derivational operations.

Under this approach, Merge applies to form Prolific Domains that are transferred cyclically the LF interface and the PF component (Grohmann, 2004) where further operations like the one in 3 (pronoun encliticisation) may apply. Let us put this discussion on concrete footing by using the following structure:

- (10) n-am vul-ak va?a  
EC-3Pers.sing.masc. give-2Pers.sing.fem. thing-FV  
“He gave you something”

In order to correctly derive the structure in (10), we make use of the split VP approach. The lexical V, vul is first merged with the indirect object personal pronoun –ak to form an intermediate projection that is forwarded to PF where pronoun encliticisation takes place. The resulting complex vul-ak, is then merged with the NP va?a which stands at spec. VP. This constituted VP which constitutes another prolific domain in accordance with (9ii) is then forwarded to the PF component. At this stage, we have the structure in (11).

- (11) va?a vul-ak

The structure in (11) is in turn selected by a v to form a v' which is merged with the subject pronoun –am (in specifier vP) to form a vP. A further merge operation applies at this level to move V plus its enclitic complement to head of vP (V to v movement which is central to the split VP approach). The resulting vP which also constitutes a prolific domain is then shipped to PF for another round application of PF operations (like 3 and 6). Since –am does not have an available host to its left, the rule in (6) then applies to make it prosodically independent. So, according to this analysis, it is the prior application of (3) at PF and the subsequent movement of V (+enclitic personal pronoun)

to *v* which derives the order V+IO+DO which is therefore a consequence of the affixal nature of the indirect object that undergoes encliticisation. This analysis would also properly derive a structure like (12) where the both objects are personal pronouns. It would mean that a second application of 3 would take the indirect personal pronoun object from its original position to dock it on the already formed *v vul-ma?*.

- (12) ?am                      vul-ma?-ta?a  
       3    pers.sing.masc.      give-1pers.plu.excl.-3pers.sing.fem  
 “He gave her to us”

We need to mention here that we have deviated substantially from Grohmann’s (2004) tripartition of a clause into a thematic domain (corresponding roughly to *vP*), an agreement domain (corresponding to *TP*) and a discourse domain (corresponding to *CP*) by assuming that the thematic domain could be split into three transferrable (to *PF*) subdomains depending on the valency of the head verb. Note that nothing stops us from doing so since a prolific domains according to (9ii), is also a part of the computational system “which consists of internal structure, interacting with derivational operations”; in this case, the verb with its arguments interacting with *Move* (internal merge) and other *PF* operations (*PE*).

#### 4 Pronouns and anaphoric demonstratives

The term anaphoric demonstrative which we borrow from Melis (1999) refers to the use of the personal pronoun in a particular kind of construction that indicates the Givenness status of a referent. The personal pronoun in this kind of construction signals that its denotation has been mentioned earlier on in the conversation. Consider a few structures with their translations to visualize this.

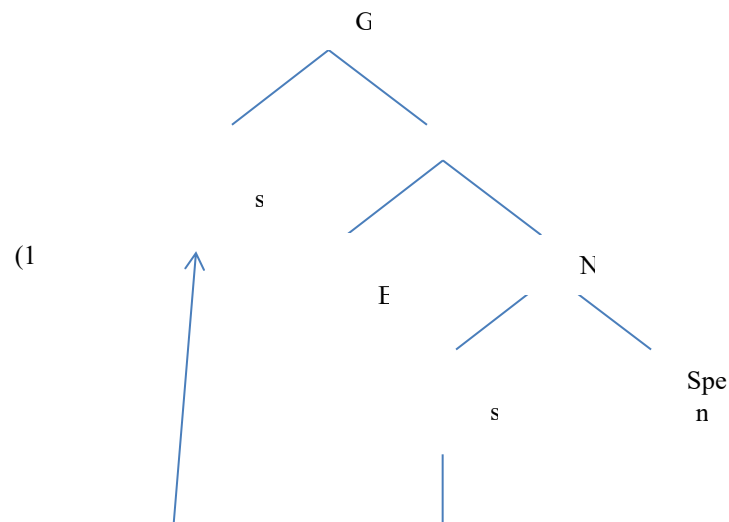
- (13) a. sa n-am-ma (Melis, 1999)  
 Man n-3Pers. sing.masc.-Spec.  
 “The man in question”  
 b. duwej n-a?-ta pot n-  
 3Pers. sing. masc.-Spec.  
 “The pot in question”  
 c. sum n-isi-na (Melis,  
 1999) Peope n-3Pers. sing.-  
 Spec.  
 “The people in question”

It can be observed from these noun phrases that the personal pronoun is always in the third person and that it agrees in gender and number with its antecedent. Another thing worth noting too is that the personal pronoun becomes the host of the specifier – *na* that is usually suffixed to the noun it determines. You may have also noticed that contrary to expectation, the personal pronoun does not encliticise on the left. Instead,

you have the epenthetic nasal which suggests that encliticisation must have been blocked. But how is this possible when the nominal host in (13) seem to appear in the same clitic group with the personal pronouns in question?

Our opinion is that, these structures are not as simple as they may seem. We want to argue that the phenomenon observed here involves movement (of the nominal antecedent) and syntactic gap filling (by the personal pronoun) because of information structure considerations (the expression of Givenness) in a configuration that bleeds the environment for PE to apply. Let us derive (13a) for example to put this clearly.

Since the specifier –na (-ma here because of assimilation) is in a number and gender agreement with the head noun sa, we assume that the two are the first to be combined by Merge to form an NP. This NP is further combined with an informational structural empty head, say Givenness (that gives the Givenness reading to the phrase) that has a strong edge feature (EF) which requires its specifier position to be filled by an element. This EF causes the extraction of sa from N to Spec. Givenness Phrase as shown in the diagram below:



At PF, a rule which we will term syntactic gap filling (SGF), applies to fill the gap left by the movement of sa. The SGF process ensures that the number and gender feature of the dislocated component receive overt realisation as a personal pronoun. Lacking a host within the NP, this pronoun gains prosodic independence through the application of the rule in 6. The specifier –na too would encliticise on the inserted pronoun to yield the output in (13a).

Facts from object focus movement and topic movement (still around information structure) in Massa provide some support to such an analysis. Consider the following examples (Melis, 1999, p. 284) from object focus in Massa.

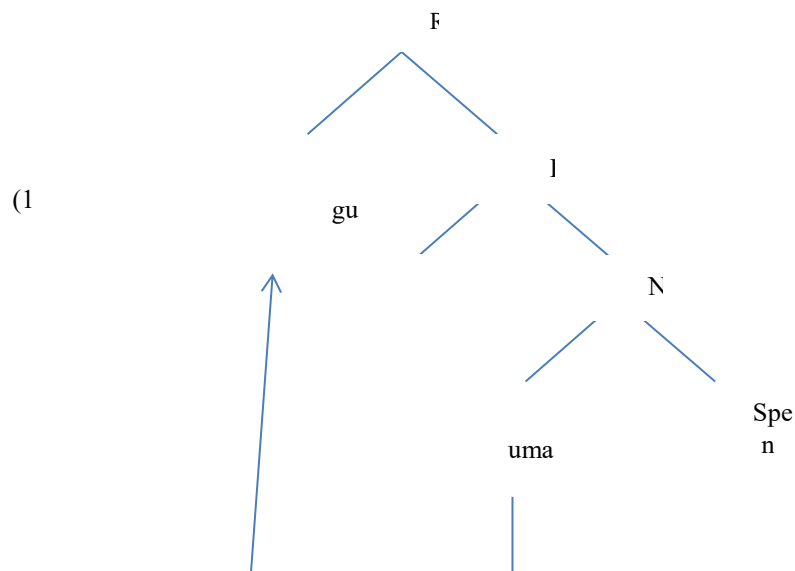




important process of relativization that provide additional support to our claim that the so called anaphoric personal pronouns (that play a demonstrative function) are actually remnants of a movement operation. Observe the structure of the 1st and 2nd persons as illustrated by Ousmanou (2007, p. 53).

- (17) a. gor ma n-an-na Child  
 Rel. n-1pers.sing.-Spec.  
 “I, this child”
- b. guro sa n-aj-na Children Rel. n-2Pers.plu.incl.-Spec.  
 “Us, these children”
- c. guro sa n-uma?-na Children Rel. n-2Pers.plu.excl.-Spec.  
 “Us, these children”

Bilola (2015) has described relativization in Massa as the promotion of a head noun from its logical position (N) to Spec. Relative Phrase. If we consider this to be the case, then structures like the ones in (17) would be derived as follows: the head noun merges with the specifier –na to form an NP that is in turn merged with the base generated relativiser ma/sa (depending on agreement), the head of Relative Phrase (RP). Head RP forces the movement of the head noun to Spec. RP. This movement creates a syntactic gap that is filled in PF (SGF) with the insertion of a pronoun which as shown in (18) below lacks a local host to encliticise on. Consequently, (6) applies to make it (the pronoun) independent.



Of course, we leave the unanswered question of how the person variable becomes relevant here whereas it did not really matter in the core so called anaphoric demonstratives, as only 3 persons are used.

## **5 Conclusion**

Based on the consistent realization of the same consonant in front of the so called disjoined personal pronouns in Massa, we have argued in this paper that there is just one set of personal pronouns in this language namely the conjoined forms. The presence of this consonant (n- or ʔ- depending on the language variety) was shown to result from an independent epenthesis rule fed by the failure of a conjoined personal pronoun to encliticise on a valid host within its clitic group (phrasal domain). Our analysis of the process of personal pronoun encliticisation in Massa vis à vis phenomena such as object reordering (within the vP domain), and the use of anaphoric demonstrative expressed the need to consider Merge as a dynamic process which transfers successive chunks of prolific domains to the PF component where morphophonological rules apply to yield grammatically acceptable structures. It appears from analysing pronoun encliticisation that Massa is a highly concatenative language whose peculiarities are yet to be explained.

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# Syntactic Structures and Semantic issues of Negation in Albanian and English (A contrastive analysis)

Arta Bekteshi<sup>1</sup> and Vilma Tafani<sup>2</sup>

South East European University, Tetovo 1200, FYROM

'A. Xhuvani' University, Elbasan, Albania

**Abstract.** Negation, in its simplest definition, is the conversion of an affirmative statement into its opposite. It is universal of all languages, however different languages have different forms and structures to express negation, resulting in different shades of meaning. This paper focuses on the literature review and on the methodology of the research.

The major aims of this research are: to see the differences and similarities of the ways we express negation in English and Albanian languages; to see how these structures are translated into Albanian; and to find out the difficulties that students face while forming negation in English especially when they switch from Albanian into English. In order to fulfill these aims a mixed-method approach will be used: a comparative analysis will be used in analyzing the use and structure of negation in three English novels and their Albanian translations; and qualitative and quantitative methods will be used to analyze students' errors and teachers' interviews regarding the difficulties that both teachers and students face in using and translating negation in these two languages.

This paper describes a study which will be conducted from the very beginning; it is a layout of the research plan which will be followed. The results obtained from the forthcoming research will be of great importance for students, teachers, translators, researchers, etc. since they will be presented with the similarities and differences of negation among these two languages, as well as students' errors.

**Keywords:** negation, English language, Albanian language

## 1 Introduction

Language is a tool by which we express our ideas and thoughts and by which we are able to negate them.

Negation can be studied by different fields of linguistics, however this research will focus on the syntactic and semantic implications of negation, the operators by which negation is realized, the structure of negative sentences, the meanings that they convey, etc.

The straightforward aim of the research is to provide students, teachers, linguists, translators, etc. some basic information of how to correctly use negation and to translate it correctly from English to Albanian.

Through using comparative research methods, the forthcoming research is expected to bring to surface some important conclusions on the expression of negation in both English and Albanian, on the correspondence of negation operators in these languages, on the varieties of translating negation from English to Albanian, as well as the difficulties that Albanian students face as ESL/EFL learners in forming English negation and translating it into Albanian.

The first part of this study will be an introduction to the topic followed by a literature review on negation in English and Albanian. It will give a theoretical description on the types and scope of negation in both English and Albanian. A description of double and multiple negation will be done and the effect that they create in a sentence. Negative operators will be described in both languages as well as the negative derivational affixes. The position of negative operators in a sentence and word order will also be given an account. All these notions will be referred to in both English and Albanian and will be illustrated by various examples. Furthermore, an analysis of the different negative operators of both languages in declarative sentences will be done, such as the word not, negative determiners, negative pronouns, negative adverbs, negative conjunctions etc. Negative questions and negative imperatives will also be given an account regarding their similarities and differences.

The second part will be a contrastive analysis of negation in English and Albanian based on three English novels and their translations into Albanian. Examples from both languages will be compared in order to find the similarities and differences of negation in these two languages. These examples will be syntactically and semantically analyzed as well. Following the comparative analysis there will be an analysis of the errors that Albanian students as ESL/EFL learners make while forming negative sentences from affirmative ones and while translating English negative sentences into Albanian. The reasons and implications of the errors will be analyzed as well.

Finally, the last part will contain a summary of the results driven from the analyses and survey. It will close by listing the limitations as well as giving further recommendations for further research and studies.

## **2 Literature Review**

Negation, by its definition, is very simple. As Blanco and Moldovan (2011) claim negation “is used to reverse the polarity of parts of a statement” (p.228). However, its use, structure and the meanings that are conveyed are not as simple as the definition. Although negation has been a subject of study in different disciplines, linguistic negation has received a lot of attention based on its complexity. Negation is something which is rejected by human nature, people prefer positive thoughts to negative ones. Precisely this difficulty in defining negative sentences is what inspired us to do a research on this universal phenomenon.

Although different languages express negation in different ways and different structures, negation is universal to all languages. As Horn (2010) puts it: “In many ways, negation is what makes us human, imbuing us with the capacity to deny, to contradict, to misrepresent, to lie, and to convey irony.” He starts his ‘Multiple negation in English

and other languages' (Horn, 2010, p.111) with a part from the sonnet 'O grammar rules! O now your virtues show!':

"But Grammar's force with sweet success confirm! For  
Grammar says (O this dear STELLA's "Nay!")  
For Grammar says (to Grammar, who says "Nay?") "That  
in one speech, two negatives affirm"."

(Sir Philip Sidney, LXIII. O grammar rules! O now your virtues  
show!, *Astrophel and Stella*, 1580)

This sonnet is a powerful example of language complexity, of expressing negation, double negation in this case, which is a delicate issue in English as a language which does not tolerate double or multiple negation. Albanian, on the other hand, is a language which tolerates both double (1) and multiple negation (2):

(1) Ajo s' tha kurrjë.  
She not said nothing.

"She didn't say anything"

(2) Askush nuk tha asgjë.  
Nobody not said nothing

"Nobody said anything"

Negative concord, double and multiple negation as well as negative polarity items have been treated by many linguists, such as Jespersen (1917), who dedicates a whole chapter to double negation in English as compared to other languages. Ton van der Wouden and Frans Zwarts (1993) give a semantic analysis of negative concord, and referring to den Besten (1986) they make a distinction between negative doubling and double negative "the latter term refers to two logical negations in the semantics, whereas the former applies to one logical negation"(p.202). Der Wouden (1994) distinguishes four types of multiple negation: 1. Negative concord and negative attraction, 2. Paratactic negation, expletive negation, etc., 3. Denial, and 4. Emphatic negation (p.9394). Other important works include those of Labov (1972) who gives an analysis of the "attraction of negative to the 'indeterminates' any, ever and either" (p. 775). Negative polarity items such as any, ever, either, as well as positive polarity items such as some, are discussed by Giannakidou (2011). Blanchette (2015) gives an account to the distribution of negative polarity items, negative concord and double negation.

Huddleston and Pullum (2002) are two great names whose works will be of crucial importance in describing and analyzing English negation. In addition Pullum in his 'A few notes on negative clauses, polarity items, and scope' describes negative clauses "in terms of modifications of canonical clauses, which by definition have positive polarity" (<http://www.lel.ed.ac.uk/~gpullum/grammar/negation>). This means that a clause, despite having a negation operator, may or may not be negative. In order to test negative clauses Klima (1964) proposes three tests:

- negative clauses take positive confirmation tags: Ben doesn't smoke, does he?
- negative clauses take *neither* continuations rather than *so* continuations: He doesn't smoke, and neither do I.
- negative clauses take *not even* continuations: He doesn't smoke, not even a single cigarette.

(as cited in Pullum, n.d., <http://www.lel.ed.ac.uk/~gpullum/grammar/negation>). These tests prove whether a sentence is truly negative or not. Huddelston and Pullum (2002) add a fourth test to these three “the subject-auxiliary inversion with prenuclear constituents: Not once did Ed read it.”(pp.786-787). Domi (2002) gives examples of structurally positive sentences, which convey a negative meaning (3) as well as structurally negative sentences which convey a positive meaning (4) such as (p. 162):

(3) Ku di unë? (= S'di unë)

Where know I

“How would I know?” – meaning that I don’t know ‘how am I supposed to know?’”

(4) Ç’ nuk kishte aty! (= Kishte nga të gjitha aty!)

What not had there

“What wasn’t there!” – meaning that there was everything ‘there was nothing that wasn’t there’.

Horn & Kato (2000), Ladusaw (1996&2001), Lasnik (1972), van der Wouden (1994) are among the names who have given a semantic description of negation and negative operators.

Based on the complex nature of negation, there are various different types of negation listed by different linguists.

According to Huddleston and Pullum (2002) there are four different types of negation: verbal and non- verbal negation, analytic and synthetic negation, clausal and sub-clausal negation, and ordinary and metalinguistic negation.

“Marouzeau (1951) distinguishes absolute negation from one related to a statement, which is termed syntactic. The latter, in its turn, can bear a word (word negation) or a sentence (sentence negation)” and he goes further with yet another classification: “simple negation vs. compound negation” (as cited in Cygan, 1965)

A very popular classification of negation is that of “sentence negation and constituent negation” (Mazzon, 2004,p.1) to which Jespersen (1917) referred to as “nexal vs. special negation”(as cited in McCawley, 1995, p.32) . Mazzon goes on with other classifications such as “ordinary vs. metalinguistic negation” (p.3), and “expletive or paratactic negation” (p.4) which occurs in examples with negative concord.

On the other hand, negation in Albanian has been treated by various linguists and grammarians, whose publications and books contribute to the understanding and analysis of negation. The most important names include Demiraj (2002), Çeliku (1998), Domi (2002), Çeçe (2014), Gosturani (1975,1976,1977,1979), Spahiu (2001), Kabashi (2000), Xherija (2014), etc. There is also a significant number of foreign linguists who have written on Albanian negation, such as Turano (2000) who has given a detailed description of Albanian negation elements.

### 3 Research Methods

In order to make the forthcoming research more reliable qualitative, quantitative and comparative methods will be used. A thorough comparative analysis will be done on the examples of negation extracted from three different novels, which are also translated



into Albanian. This analysis will give a complete and detailed description of negation in both English and Albanian. In addition, the quantitative and qualitative analysis will be applied in the analysis of students' translation tasks and teacher interviews on negation. Furthermore, all the data will be compared in order to find out the similarities and differences of negation in English and Albanian.

### **3.1 Research Aims**

The major aims of this research are:

- To see the differences and similarities of the ways we express negation in English and Albanian languages
- To see how these structures are translated into Albanian
- To find out the difficulties that students face while forming negation in English especially when they switch from Albanian into English.

### **3.2 Research Questions**

- Despite using approximately the same negation operators, is negation structured and expressed in the same way in both English and Albanian?
- Which are the significant differences in the structure of negative sentences between English and Albanian?
- Is Albanian multiple negation a problem for ESL/ EFL Albanian students?
- Does the English use of auxiliaries in negative sentences of simple tenses appear to be a problem for Albanian students?

### **3.3 Research Hypotheses**

The forthcoming research will focus on these hypotheses:

1. Although both English and Albanian use approximately the same negation operators, negation is structured and expressed in different ways in these two languages
2. There are structural differences in the way that we express negation in English and in Albanian
3. Albanian language, as students' L1, interferes in the correct use of English negation by EFL/ ESL Albanian students.
4. English insertion of auxiliaries in the negative form of simple tenses, poses a problem for EFL/ESL Albanian students

## **4 Data Gathering Procedure**

As this is a contrastive analysis, several literary works and grammar books of both languages will be used in order to accomplish the research.

#### **4.1 Participants**

The participants of the study will be third year Albanian students of State University of Tetovo in Tetovo, South East European University in Tetovo and ‘Zef Lush Marku’ secondary school in Skopje. The number of students will be 200, both male and female learners of different ages, from 17 to 23. Furthermore approximately 20 teachers will be interviewed on their experience on teaching negation.

#### **4.2 Materials**

Three different novels in English, and their translations in Albanian, will be used as instruments to conduct this study. The proposed novels include:

1. E. M. Forster '*A room with a view*'; and its Albanian translation '*Mos e lufto pranverën*' by Etleva Cepele;
2. Virginia Woolf '*Mrs. Dalloway*'; and its Albanian translation '*Zonja Dalloway*' by Dorian Kroqi;
3. Danielle Steel '*The Sins of the Mother*'; and its Albanian translation '*Mekatet e nenes*' by Taulant Hatia.

Examples of negation from these novels will be analyzed, compared and described in order to draw conclusions on their use, structure and meaning.

#### **4.3 Instruments Translation Tasks**

Translation tasks will be used as a tool to find out whether Albanian as students' L1 influences the way they use negation in English as ESL/ EFL.

#### **4.4 Interviews**

Interviews with teachers will be used in order to find out the difficulties that they face in teaching English negation to Albanian students and their views on students' performance and difficulties.

#### **4.5 Research Ethics**

Although the forthcoming research will be a low risk research, all the participants of the study will be given a written consent form; university students will sign a personal consent form, while secondary school students, since they are under 18, will be given a consent form that will be signed by their parents or tutors.

## 5 Data collection and analysis

In order to analyze the data collection, the descriptive analysis will be used from the grammar books to present the structures and functions of English and Albanian negative constructions. A detailed grammatical description will be presented. The comparative analysis will be used from the novels to find out the similarities and differences between the English and Albanian negation. The English negative constructions will be selected from the novels, as well as their Albanian correspondents in the Albanian translations. The research is also based on the translation tasks which will be used to analyze and present the results regarding the students' errors and mistakes in using negation in both languages. It will provide different exercises which will prove the most common errors that Albanian students of English language make in forming and using negation, as well as whether those errors are as a result of L1 transfer or poor instruction.

### 5.1 Conclusion

Having in mind that this paper is only a layout of a research, it is focused on the literature review and the methodology of the forthcoming study. At this stage there are no results, however, the results of the forthcoming study will show the similarities, differences, controversies and the students' mistakes concerning negative constructions, in English and Albanian. Thus, helping students, researchers, translators, etc., to correctly use, and respectively translate these structures from English into Albanian.

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# Attitudes Towards Regional and Minority Languages in Kosovo

Arta Musollaj

South-East European Research Centre, Thessaloniki, Greece

**Abstract.** In the last twenty years, sociolinguistic studies and sociology of language particularly, have been concentrated on studying the prospects of minority languages within a particular community or country. In the case of Kosovo, the Constitution recognizes Albanian and Serbian as official languages in national level. Meanwhile, languages such as Bosnian, Turkish, Gorani, and Romani are recognized in municipality level if they meet some specific criteria as described by the Law on Languages in Kosovo. The focus of the present study is to examine the attitudes of Kosovars towards regional and minority languages, such as Serbo-Croatian, Macedonian (considered as regional languages), as well as Bosnian, Gorani, Romani, and Turkish language (minority languages in Kosovo).

**Keywords:** Sociolinguistics, Language attitudes, Minority languages.

## 1 Attitudes and Language attitudes within the area of Sociolinguistics

The significance of language attitude studies to the field of sociolinguistics has been discussed by several scholars, among them Agheysi and Fishman (1970), Baker (1992), Aiken (2002), and

Swales (1990). According to Agheysi and Fishman (1970) “the relevance of attitude studies to such sociolinguistic topics as language choice in multilingual societies, differential allocation of codes, dialect differences and mutual intelligibility -to name a few- is obvious.” (p.137). Similarly Baker (1992) states that there are many explanations why studies regarding language attitudes are significant, putting emphasis on the word “attitudes”, which according to him is easily understood by everybody. The significance of those studies lays on the fact that they are an important indicator of society’s beliefs and the future of those languages within a community. Besides the definitions regarding the significance of language attitude studies in sociolinguistics, it is important to explain the concept of attitude more explicitly. To start with, attitudinal research is considered substantial within the area of social sciences that deal with analysis of human behavior, such as social psychology. Thus, the term attitude is explained through different perspectives in the field of social psychology (Edwards, 1994) including the mentalist perspective and behaviorist perspective.

According to Allport (1935) the mentalist perspective defines attitudes as “a mental or neutral state of readiness, organized through experience, exerting a directive or

dynamic influence upon the individual's response to all objects and situations with which it is related (cited in Baker 1992: 11). In the same line, Fasold (1984: 147) states that attitudes are "a deep-seated state of readiness rather than an observable response". On the contrary, the behaviorist perspective considers attitudes as visible reactions to social situations, with direct concentration on self-reports and actual behavior by the individuals (McGuire 1969).

A more comprehensive definition about attitudes is given by Aiken (2002), who states that "attitudes may be viewed as learned cognitive, affective, and behavioral predispositions to respond positively or negatively to certain objects, situations, institutions, concepts, or persons." (p.3). In other words, he considers attitudes as something that is learned and developed as a result of individuals' interactions within a given community. Moreover, Aiken (2002) states that attitudes are formed by cognitive, affective, and behavioral components. Cognitive (meaning that they express beliefs), affective (meaning that they express feelings about a certain object), and behavioral (meaning that they express or promote actions). Besides Aiken (2002), other scholars have classified language attitudes in these three components as well, such as Fishbein and Ajzen (1975), Baker (1992), and Cargile et al. (1994).

Since there is no universal approval for a specific definition regarding attitudes, Aiken's (2002):

3) theory that attitudes are "learned predispositions to respond positively or negatively to certain objects" is considered as a useful point to start with. That is to say, in relation to language attitudes, language is the 'object' of those predispositions being held. Nevertheless, studies on language attitudes are rarely restricted on the language alone; they are extended to analysis of attitudes towards speakers of other languages or language varieties, language use, linguistic policies, language maintenance etc. (O'Rourke, 2005). A specific definition about language attitudes has been given by Ryan et al. (1982: 7) who define them as "any affective, cognitive or behavioral index of evaluative reactions toward different language varieties or their speakers." On the same way, but from a broad perspective Adegbija (2000: 77) states that language attitudes

"accommodate evaluative judgements made about a language or its variety, its speakers towards efforts at promoting, maintaining or panning a language, or even towards learning it. The concept of language attitudes has been further extended by Ajzen (1988: 4), who states that other relevant 'objects' can affect language attitudes as well, such as 'institutions' and particular 'events'.

Language attitude research has separated scholars in terms of behavioral dimension. Many scholars claim that attitudes are not perfect indicators of behavior. Scholars that support behaviorist models claim that concentration should be made not in behavioral intentions but rather on actual behavior. Wicker's (1969: 67) theories provide a better understanding of language attitudes and language behavior, with special focus on minority languages. According to him, someone's behavior can be influenced by his/her "verbal, intellectual and social abilities". In terms of language attitudes, this would mean that someone might, for instance, claim to have positive attitudes about the use of minority languages, but feel incapable to change his/her first language. Another factor to be considered is the social context. In other words, even if a person might have

positive attitudes about a certain language, he/she might be unable to practice it, because other members of his/her community might find that particular language as inappropriate to use; or simply because he/she might be stigmatized because of the usage of that language. On the other hand, someone might have negative attitudes about a certain minority language, but he/she might be required to learn it for a specific purpose. In these circumstances, necessity outweighs attitudes towards the language. Based on the given examples, one can easily claim that language attitudes are not necessarily reliable indicators of behavior, and vice versa. Even though many scholars have pointed out similar contradictions regarding language attitudes and language use, according to Baker (1992), “attitudes may be better predictors of future behavior than observation of current behavior” (p. 16). In the context of minority languages, this concept may be a useful indicator especially for language policy makers, so as to intervene and improve minority language conditions through institutional support.

## **2 Measuring language attitudes – Methodology**

In the area of linguistics, scholars may employ three types of methodologies: quantitative, qualitative and mixed methods. According to Dorney (2007), the quantitative methodology employs “three key stages in the research process, stated as in following: a) identifying a problem, b) generating an initial hypothesis, c) testing the hypothesis by collecting and analyzing empirical data using standardized procedures.” this method, according to him, minimizes the researcher bias or prejudice, because it offers the means to explore questions objectively. (p.31). On the other hand, qualitative research is mostly concerned with the reasons that affect human behaviour, by answering questions such as “why”, or “how”. Since those qualities cannot be observed or measured directly, the methods for collecting information vary (e.g. case studies, focus groups, interviews, etc.). And finally, the last method as explained by Dorney (2007) is the mixed method, which is a combination of qualitative and quantitative methodology. In regards of methods available for investigating language attitudes, Ryan et al. (1988: 168) explain that there are three available methods on language attitude studies:

- societal treatment studies
- direct measures and
- indirect measures

The first method, also known as content analysis, does not involve respondents. According to

Knops and van Hout (1988: 6) societal treatment studies “refer to a broad category of language attitude studies where autobiographical, observational, ethnographic and historiographic methods are used.” In other words, scholars collect the data from media scripts, documents, advertisements, and other sources that they consider most appropriate for their study. This method, as Garret (2010:

51) states, allows researchers to understand better “the societal meanings and stereotypical associations of languages and language varieties, making societal treatment studies valuable.” The second method - also explained by Milobog and Garret (2011) -



involves respondents, and measures their language attitudes by asking direct questions through questionnaires, interviews, and surveys. Questions could be either close-ended or open-ended, such as: “yes-no” type, or “wh” questions. The involvement of the participants is the main difference between the first two techniques. Also, the number of scales employed by this method may differ. According to Baker (1992), researchers may employ a 10-point scale for measurement of language attitudes (e.g. towards minorities), from “I favour” to “I oppose”. On the other hand, other researchers may prefer to use the Likert scale from “Strongly agree” to “Strongly disagree”. This method is considered to be the most employed form in the measurement of attitudes.

And the last method, indirect measures - also known as matched-guise test – elicits language attitudes of participants implicitly. In other words, by using this method, researchers investigate the attitudes of participants without asking them direct questions; so that they are not aware of the nature of the test. In these studies, a speaker who is fluent in two languages or both dialects of the same language, reads the same text in both variations (Richards and Schmidt, 2010). Since the participants are not aware that the same person is reading both of the texts, they are asked to evaluate the speaker on an attitudinal rating scale. The main advantage of this technique, as stated by Garret (2010: 57) is that it “allows researchers to better elicit people’s private attitudes as they reduce the possibility for societal desirability.” Nevertheless, the decision for choosing one method over another depends on the researcher and the nature of the study. As Silverman (2000) states, one needs to make pragmatic choices when deciding about the methodology of the chosen research topic, because those choices need to be matched accordingly with the research questions.

### **3 Regional and minority languages – the case of Kosovo**

By declaring the independence on February 17<sup>th</sup> 2008, the institutions of Kosovo were committed to implement the Comprehensive Status Proposal (also known as Ahtisaari’s Plan). The

Constitution of the Republic of Kosovo has been based on Ahtisaari’s Plan provisions, with special focus on the protection of the rights of community minorities in the country. As stated in the

Proposal and adopted also in the Constitution of the country, Kosovo “shall be a multi-ethnic society” (Ahtisaari’s Plan, 2007: 1; Kosovo Constitution 2008: 2) that consists of Albanians and other Communities living in the country, who shall all be treated as equal individuals. The representation of Kosovo as a multi-ethnic society is also reflected in Kosovo’s flag where the geographical shape of Kosovo is positioned on a blue field, surrounded by six stars – each of them representing the country’s six main ethnic groups: Albanians, Serbs, Turks, Gorani, Roma, and

Bosniaks. Institutional support plays a vital role in the maintenance and survival of minority languages. In the case of Kosovo, the Constitution of the country recognizes Albanian and Serbian as the official languages in national level. Meanwhile, “Turkish, Bosnian and Roma languages have the status of official languages at the municipal level or will be in official use at all levels as provided by Law.” (Chapter 1, Article 5). Hence,

according to the Law on the Use of Languages, Turkish, Bosnian, and Roma languages are recognized as official languages at the municipality level if the speakers of those languages reach 5% of the population in the municipality. If the speakers of those languages consist of 3% in a particular municipality, then their language shall have the status of the language in official use (Article 1, ii).

Besides Albanian and Serbian as official languages in the national level, there are four municipalities in Kosovo that recognize the status of Turkish and Bosnian languages as official languages because they meet the requirements specified by the Law on the Use of Languages. As stated by the Office of the Language Commissioner of the Office of the Prime Minister in Kosovo, in Peja (western Kosovo), besides Albanian and Serbian, Bosnian language is an official language within the municipality. In Mamusha (southern Kosovo) the third official language in municipality level is Turkish. In Prizren (southern Kosovo), Bosnian and Turkish are known as official languages. And finally, in Dragash (southern Kosovo), Bosnian language is recognized as the third official language in municipality level. The speakers of the minority languages make up a small percentage of the total number of population in Kosovo. The Turk community makes up 1.01% of the total population in Kosovo. Roma community makes up 0.84%, Ashkali community makes up around 0.83%, Egyptian community in Kosovo makes up around 0.61%, and the Gorani community makes up around 0.58% of the total population in Kosovo (Office of the Prime Minister, 2018).

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- By promoting the integration of researchers from universities and research centres in the SEE region into networks of excellence.



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