



UNIVERSIDAD
NACIONAL
DE COLOMBIA

Networking as a Word of Mouth Marketing Strategy in Entrepreneurial Contexts

Sebastián Robledo Giraldo

Universidad Nacional de Colombia Facultad de Ingeniería y Arquitectura, Departamento
de Ingeniería Industrial
Manizales, Colombia
2018

Networking as a Word of Mouth Marketing Strategy in Entrepreneurial Contexts

Sebastián Robledo Giraldo

Tesis o trabajo de investigación presentada(o) como requisito parcial para optar al título
de:

Doctor en Ingeniería – Industria y Organizaciones

Director (a):

Ph.D. Néstor Darío Duque Méndez

Línea de Investigación:

Sistemas de Gestión de Tecnología, la información, el conocimiento y la innovación
tecnológica en la Industria y Organizaciones

Grupo de Investigación:

Grupo de Ambientes Inteligentes Adaptativos GAIA

Universidad Nacional de Colombia

Facultad de Ingeniería y Arquitectura, Departamento de Ingeniería Industrial

Manizales, Colombia

2018

“You know that those who are regarded as rulers of the Gentiles lord it over them, and their high officials exercise authority over them. No so with you. Instead, whoever wants to become great among you must be your servant, and whoever wants to be first must be slave of all. For even the Son of Man did not come to be served, but to serve, and to give his life as a ransom for many.”

Jesus

Acknowledgments

I want to thank God for his mercy because, among so many intelligent people who deserved to do a doctorate and receive a scholarship, He chose me, perhaps the least prepared. I also want to thank Jesus because his sacrifice at the cross cleansed my sin and allowed me to have peace in prayer again and therefore in my studies. Also, the Holy Spirit who gave me the strengths and ideas during the whole trip of the doctorate. Therefore, the strongest feeling I can express is gratitude for receiving an undeserved favor, thus, the only thing I have left to do is to serve.

I wish to express my gratitude to wife Martha Viviana for being the inspiration to start and end this trip. She was always present in all the moments, the pretties and the uglies, supporting me with her words and her example. Enduring listening to the same topic for years without complaining and always making an effort to find something interesting in the conversations. For the person, who maybe knows this research better than me, thank you.

Also to my mother Dora, who taught me when I was a teenager, what it is shown in this thesis. Something that I used to deny, selling products, has become a Ph.D. subject. Thus, everything I show here, she taught me in the best way that exists: with example. That's why this work has more of her than of me, thank you.

This trip would not have started and ended without the help of my director, Nestor. Since he decided to support my ideas unconditionally, knowing that many would not reach good results, and others got me into troubles. His work was more than that of a supervisor, it was that of a master who knew how to teach his disciple through his own errors, giving him the opportunity to make mistakes many times. The feeling is of respect and admiration for the person he is and the work has done in the university.

Finally, I want to thank the “Instituto Colombiano para Ciencia y Tecnología” (Colciencias) and its program “Generación del bicentenario”. Also, this investigation was partially supported by Universidad Nacional de Colombia under project No. 32059 (Code Hermes) entitled “Consolidación de las líneas de investigación del Grupo de Investigación en Ambientes Inteligentes Adaptativos GAIA” within the “Convocatoria interna de investigación de la Facultad de Administración 2015, para la formulación y ejecución de proyectos de consolidación y/o fortalecimiento de los grupos de investigación. Modalidad 1: Formulación y ejecución de proyectos de consolidación”. Finally, we also would like to thank the library of Universidad Nacional - Sede Manizales for the diffusion of ToS, and its support in this project.

Networking como una herramienta del marketing boca a boca en contextos emprendedores

Resumen

El propósito de esta investigación es crear un Modelo de Network Marketing (MNM) para emprendedores apoyándose en las actividades de networking para activar los procesos de voz a voz. Para alcanzar esto, se apoyan los hallazgos teóricos en tres pilares: Marketing Emprendedor (ME), actividades de networking y el marketing boca a boca. Estos tres conceptos son explicados en los Capítulos 1 y 2. Adicionalmente, esta tesis aborda dos preocupaciones relevantes en el área de ME y el marketing boca a boca: la influencia de las redes sociales y los actores en los procesos del marketing boca a boca en un contexto emprendedor. Estas cuestiones fueron desarrolladas a través de simulaciones usando Modelado Basado en Agentes (MBA) en el Capítulo 3 y un experimento empírico en el Capítulo 4. Finalmente, el Capítulo 5 propone el MNM de acuerdo a los principales hallazgos encontrados en las secciones previas.

Palabras clave: Marketing Emprendedor, networking, marketing boca a boca.

Abstract

The purpose of this research is to create a Network Marketing Model (NMM) for entrepreneurs relying on networking activities to activate Word of Mouth processes. In order to achieve this, we support our theoretical findings in three pillars: Entrepreneurial Marketing (EM), networking activities, and Word of Mouth Marketing (WOMM). These 3 frameworks are explained in Chapters 1 - 2. Additionally, this thesis addresses two relevant concerns in the area of EM and WOMM: the influence of social networks and the actors in WOM processes in an entrepreneurial context. These issues are developed through simulations using Agent-Based Modeling in Chapter 3 and an empirical experiment in Chapter 4. Finally, Chapter 5 proposes the NMM according to the main findings of previous sections.

Keywords: Entrepreneurial Marketing, Networking, Word of Mouth Marketing.

Table of Contents

Resumen	IX
List of Figures	XIII
List of Tables	XV
Introduction	1
1. Conceptual Framework	9
1.1 Introduction	9
1.2 Entrepreneurial Marketing	9
1.3 Networking in Entrepreneurship	11
1.4 Word of Mouth Marketing	15
2. Literature review	19
2.1 Introduction	19
2.2 Entrepreneurial Marketing	20
2.2.1 Effectuation	23
2.2.2 Social Media Marketing	24
2.2.3 Networking in entrepreneurship	24
2.3 Marketing by networking	24
2.3.1 Marketing networking	26
2.3.2 Strategic network marketing model	28
2.4 Word of Mouth Marketing	29
2.4.1 Word of Mouth actors	33
2.4.2 Network structure	35
3. Do marketing networks really help startups? Simulating sales through Agent-Based Modeling (ABM) and complex networks	39
3.1 Introduction	39
3.2 Study I: The influence of network structure in the WOM process	41
3.2.1 The artificial market	49
3.2.2 Experiment I: The impact of structural ego-network properties on total market sales	50
3.2.3 Experiment II: Identification the best strategy in the diffusion process	50
3.2.4 Results	51
3.3 Study II: Influence of promoters in the WOM process	54
3.3.1 The artificial market	54
3.3.2 Experiment I: Importance of promoters	55
3.3.3 Experiment II: Strategies	56

3.3.4	Results	56
4.	How are Word of Mouth Sales Activated? Networking Strategies for Entrepreneurial Marketing	63
4.1	Introduction	63
4.2	Method	65
4.2.1	Data overview	65
4.2.2	Data processing	67
4.2.3	Measurements	67
4.2.4	Results	68
5.	The Network Marketing Model	73
5.1	Introduction	73
5.2	The Network Marketing Model	74
5.3	Network marketing dimensions	76
5.3.1	The structural dimension	77
5.3.2	The relational dimension	77
5.3.3	The human dimension	78
5.4	Network Marketing actors	79
5.4.1	Influencers	79
5.4.2	Opinion leaders	80
5.4.3	Revenue leaders	80
5.5	Network Marketing strategies	80
5.5.1	Referrals	80
5.5.2	Incentives	81
5.5.3	Events	82
6.	Discussion	83
7.	Conclusions and recommendations	85
7.1	Introduction	85
7.2	Principal findings	85
7.2.1	Network structure influence on WOM in the EM context	85
7.2.2	WOM actors influence on WOM in the EM context	86
7.2.3	The Network Marketing Model	86
7.3	Managerial implications	87
7.4	Future research perspectives and limitations	87
A.	Appendices for Chapter 3	89
B.	Appendices for Chapter 4	90
C.	Appendices for achievements	91
	References	99

List of Figures

Figure 1-1:	This study's contribution to marketing research.....	3
Figure 1-2:	Thesis structure	5
Figure 1-1:	Social networks in networking activities	12
Figure 1-2:	Type of influence of a node to its network position	13
Figure 1-3:	Change in the entrepreneurial social network structure.....	14
Figure 2-1:	Tree of Science for Entrepreneurial Marketing	21
Figure 2-2:	Tree of Science for networking in entrepreneurship. The four branches (red circles) represent the different perspectives: innovation, internationalization, financing, and marketing.	26
Figure 2-3:	Marketing Network Process (MNPs)	27
Figure 2-4:	The Strategic Network Marketing Model (SNMM)	29
Figure 2-5:	Tree of Science of Word of Mouth Marketing (WOMM).....	31
Figure 2-6:	Example of hubs and bridges in a social network.....	33
Figure 3-1:	Network concepts applied in marketing networking for small firms. (a) Example of a small firm owner's social network (links and nodes) and NM small firm components. (b) Example of high-density node.....	42
Figure 3-2:	Scale free complex networks: (a) Barabási et al. (1999) and (b) Amaral et al. (2000) models	43
Figure 3-3:	Artificial market. (a) Network of customers within the personal network of a small firm owner. (b) Susceptible-Infected-Resistant model applied to marketing networking for small firms.	46
Figure 3-4:	Types of markets: (a) average, (b) social and (c) rational with Janssen's and Jager's cognitive model.....	48
Figure 3-5:	Network Marketing in small firm diffusion process	48
Figure 3-6:	Example of Total Market Sales (TMS)	50
Figure 3-7:	Strategies for marketing networking in small firms.	51
Figure 3-8:	Total market sales in all markets and for all strategies.	53
Figure 3-9:	Environment of the simulated market in NetLogo Software.....	55
Figure 3-10:	WOM sales versus promoters (%)	57
Figure 3-11:	Performance of network marketing strategies	59
Figure 4-1:	Tree of Science word of mouth process	65
Figure 4-2:	K-means clustering analysis	70
Figure 5-1:	Network marketing model explained.....	75
Figure 5-2:	Dimensions of network marketing model.	76
Figure 5-3:	Example of a real online social network.....	77

Figure 5-4:	Relational dimension examples	78
Figure 5-5:	Human dimension	79
Figure 5-6:	Referral strategy of the network marketing model.	81

List of Tables

Table 1-1:	Major types of WOM programs.....	16
Table 3-1:	Influence of structural network characteristics on total market sales.	51
Table 3-2:	Non-parametric analysis of variance (Kruskal-Wallis)	52
Table 3-3:	Multiple comparisons (Tamhane's post hoc test)	53
Table 3-4:	Descriptive statistics of WOM sales vs promoters.....	57
Table 3-5:	Normality test data in Experiment I.....	58
Table 3-6:	Kruskal-Wallis test in Experiment I.	58
Table 3-7:	Kruskal-Wallis Post hoc test. WOM sales vs promoters.....	58
Table 3-8:	Descriptive statistics. WOM sales for each strategy.....	59
Table 3-9:	Normality test. WOM sales for each strategy.	60
Table 3-10:	Levene test. WOM sales for each strategy	60
Table 3-11:	ANOVA. WOM sales for each strategy	60
Table 3-12:	Tukey Post-hoc test. WOM sales for each strategy	61
Table 4-1:	Correlation matrix	68
Table 4-2:	Summary of regression analysis predicting invitations sent.	69
Table 4-3:	Impact of each WOM actor in WOM activations	70
Table 6-1:	Summary of hypothesis testing results.	83

Introduction

There are a large number of articles which show the contribution of entrepreneurship¹ to economic prosperity (Ferreira et al., 2017), job generation (Welter et al., 2017), and innovation (Gumbau Albert, 2017). For example, in order to increase the Gross Domestic Product (GDP) in the U.S., one of the strategies would be to generate between thirty and sixty innovative startups, which grow to create \$1 billion in yearly revenue (Litan 2010). Additionally, entrepreneurship achieves levels of approximately 60-70 percent in employment generation in high-income countries (Rocha 2012). Therefore, research is necessary for the analysis and support of these firms, in terms of creating and maintaining competitive advantages, for example, in marketing activities.

This is particularly important, as ventures face difficulties when applying traditional marketing concepts to the commercialization of new products² (Stokes 2000), given that they lack time, as well as marketing resources and knowledge (Dragnic 2009). Entrepreneurship, or small firm marketing, is not a scaled-down version of “big firm marketing” (Hill 2001), given that startups have unique characteristics which set them apart from large companies (Reynolds 2002). Among other things, a shortage of financial resources and a typical focus on niche markets makes big-scale marketing campaigns impractical. At the same time, they do have marketing advantages over large firms, given that they can capitalize on the unique benefits of “smallness” (Jones & Rowley 2011). The principal advantage of smallness is flexibility, allowing for a faster response to market changes and opportunities than their larger counterparts (Carson & Cromie, 1990). Therefore, it is crucial to identify marketing techniques that help entrepreneurs to sell their offerings, and which correspond to their special characteristics.

¹ The terms ‘entrepreneurship’ and ‘small firm’ will be used in the same way, as the differences between the two are not considered to be pertinent in this context.

² The terms ‘product’ and ‘service’ will be used interchangeably, as the differences between them are irrelevant in this context.

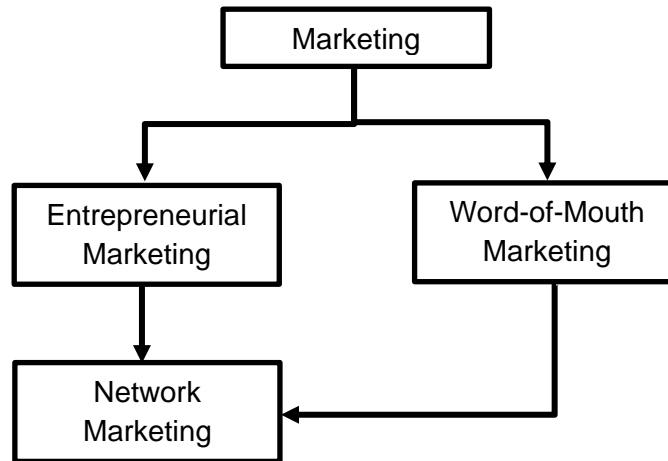
Similarly, ventures tend to be highly dependent on networking activities for product marketing (Slotte-Kock & Coviello, 2010). Networking involves informal information gathering through personal contacts (Stokes, 2000), and facilitates the generation and formation of customer contacts (Shaw 1999), as well as providing opportunities for social capital generation (Shaw, 2006). In other words, possession of a superior product is sometimes insufficient, and encouragement stemming from personal social networks is necessary for marketing success. As a result of the interconnection between market technologies and market players, sales are influenced by those who reciprocally impact the behavior of others, and will not switch to new products until most of their acquaintances also switch (Aarikka-Stenroos, Sandberg, & Lehtimäki et al. 2014). Therefore, the support of network actors is necessary in order to promote new product marketing (Partanen, Chetty, & Rajala 2014). Marketing Networking (MN) activities enable venture sales (O'Donnell 2014; Hakimpoor et al. 2011), as MN is defined as the “network processes that are undertaken by small firm owner-managers in managing their marketing activities” (Carson et al. 2004). O'Donnell (2014) even postulates that all startup or small firm marketing activities can be assisted by networking. Thus, for ventures facing increasingly stringent financial conditions and greater competition, it is vital to know how to use networks to market their products (Aarikka-Stenroos et al. 2014).

At the same time, it is challenging for a small firm to initiate networking processes, given that success often requires cooperation among parties (Story, Hart, & O'Malley, 2009). In this regard, marketing researchers have tried to understand the activators of Word of Mouth (WOM) sales (Chevalier & Mayzlin, 2003; Godes, David, & Dina, 2004; Risselada, Hans, Verhoef, & Bijmolt, 2015). Certain results have shown the importance of particular actors, social influence, and critical mass (Robledo, Méndez, Zuluaga, 2013).

However, this effort has been focused, largely, from a big firm perspective (Liu & Yong, 2006; Trusov, Bucklin, & Pauwels, 2009). Overall, this research activity has been somewhat limited, in terms of scholars' ability to explain WOM sales for entrepreneurship (Chollet, Géraudel, & Mothe, 2014). In response, researchers have acknowledged the idea that WOM sales, for entrepreneurship, may also be largely determined by networking activities (Stokes & Lomax, 2002). Therefore, the purpose of the present study is to identify those elements which activate WOM sales in an entrepreneurial context, and finally, to propose a conceptual model of marketing for entrepreneurship, which will be called the “Network

Marketing” model. Thus, this study will contribute marketing research, in the entrepreneurial context, using networking activities that activate WOM sales (Figure 1-1).

Figure 1-1: This study’s contribution to marketing research



Insights from the present investigation are particularly relevant for entrepreneurs aiming to exploit WOM sales. Our preliminary results show that random-grow has no influence on WOM sales. Therefore, entrepreneurs should be select, connected customers, in order to ease WOM sales. Also, referral-grow has a positive influence on WOM sales. Entrepreneurs should ask for referrals in the course of their daily selling activity, in order to leverage sales. Finally, it was found that promoters have a positive relationship with WOM sales. Therefore, entrepreneurs should identify users with high satisfaction levels, in order to create networking strategies with them, such as events or incentives. Identification of the best networking strategies in an Entrepreneurial context is important because entrepreneurs should care their marketing time because they could waste many hours on poor marketing strategies.

Research Question

This thesis seeks to explore the following research question in an entrepreneurial context, and using networking strategies:

What are the elements that activate Word of Mouth sales using networking strategies in an entrepreneurial marketing context?

In accordance with the above research question, the objectives of this study will be:

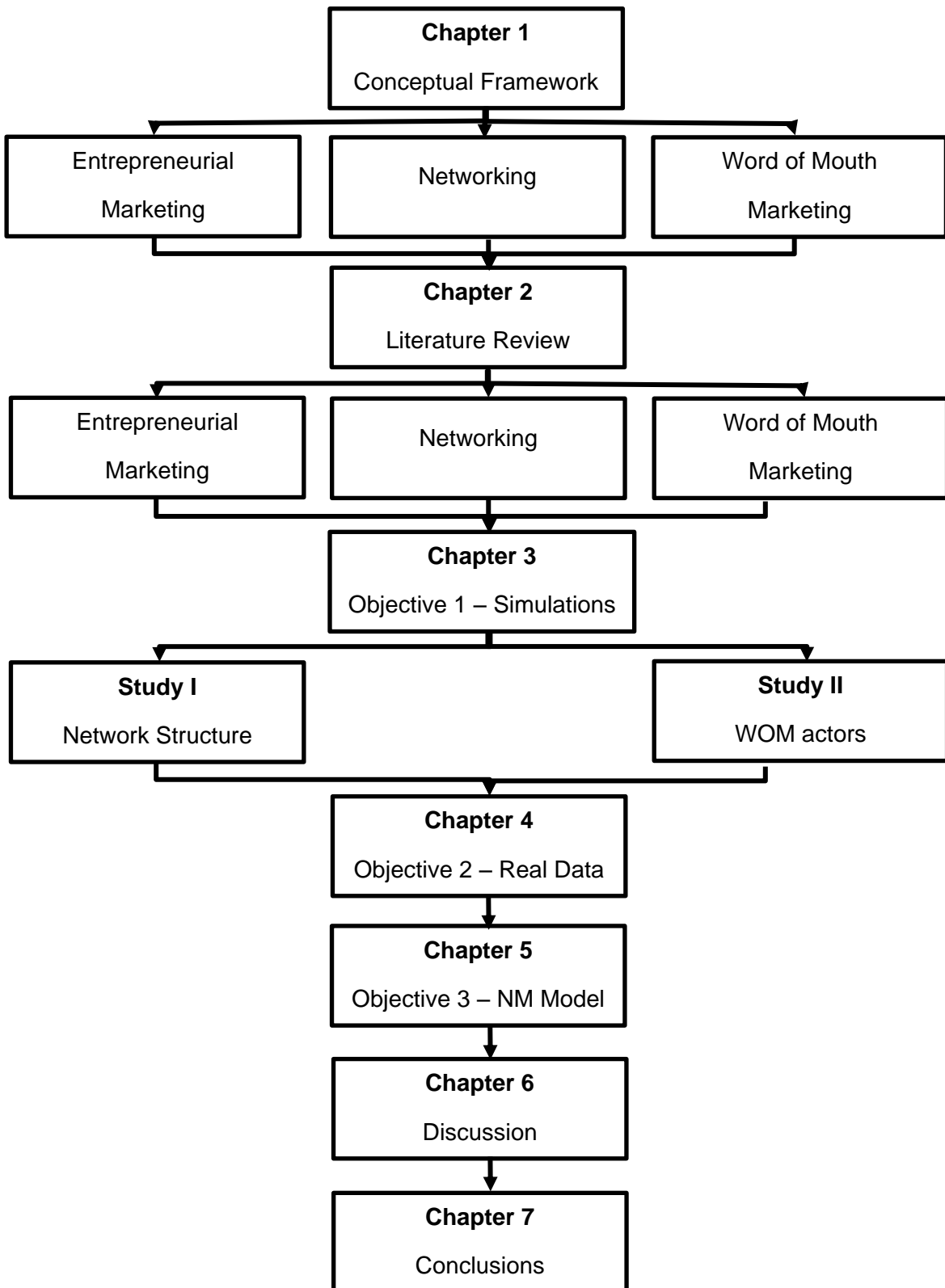
General Objective

Create a conceptual marketing model, based on networking activities, in order to activate Word of Mouth sales in an Entrepreneurial Marketing context.

Specific Objectives

1. Design and implement an agent-based simulation, so as to determine those networking strategies which best activate Word of Mouth sales.
2. Compare the results of said simulations with data from a real entrepreneurial product, in order to validate and improve networking strategies.
3. Define a conceptual model for marketing, in accordance with the best strategies, obtained from simulations and the real data.

In order to answer the research question and achieve the established objectives, this thesis presents a structure with seven Chapters, as described below. Figure 2 explains the structure of the thesis, containing three dominant concepts, which constitute the three pillars of this thesis: entrepreneurial marketing, networking, and word of mouth marketing. Additionally, objectives one, two, and three are met in Chapters three, four, and five respectively.

Figure 1-2: Thesis structure

The first Chapter contextualizes the main concepts: Entrepreneurial Marketing, Networking, and Word of Mouth Marketing. This context makes possible to introduce the objective of study: the proposal of a marketing model for entrepreneurs. The model is created, based on the importance of Word of Mouth sales as a key element for the improvement of performance through networking activities. The Network Marketing model will be developed in Chapter 5.

Chapter two provides an overview of the relevant literature related to Entrepreneurial Marketing, networking, and Word of Mouth Marketing. This Chapter, as the first, is divided into three main parts, one for each topic. Each part is described, using the Tree of Science analogy (for more details Robledo et al., 2013, Robledo et al., 2014, Zuluaga et al., 2016); it begins with seminal publications (roots), continues with structural publications (trunk), and ends with current literature streams (leaves). The last section presents the discussion, as well as novel ideas on each topic. As a result of the literature review, two hypotheses are proposed regarding the influence of the *network structure* and *word of mouth marketing actors* in the diffusion process in an entrepreneurial marketing context.

The third Chapter is divided into two studies. The first explains the influence of network structure in the WOM process, and the second explains the influence of WOM actors (promoters) in the WOM process, both from an entrepreneurial marketing context. In both studies, an artificial market is created with an entrepreneur (initiator), potential customers, existing customers, and highly satisfied and unsatisfied clients. This market was generated using Agent-Based Model (ABM) theory. ABM is a new approach to simulating the behavior of agents and their interactions with the purpose of understanding the full effects of their attributes (Macal & North, 2010). Similar approaches are system dynamics (Borshchec & Filippov, 2004) and cellular automata (Cho, Hwang, & Lee, 2012), however both perspectives lack of the emergence of self-organization effects that are well distinguished in ABM. At the end, results will be discussed, and relevant conclusions will be highlighted. Consequently, in this Chapter, the first objective of this thesis is achieved.

The second specific objective is to contrast previous results with real data. For that reason, in Chapter 4, a technological product “Tree of Science” (ToS)³ is created and promoted, in order to empirically assess the influence of network structure and WOM actors in the diffusion process. The only way to access ToS is through an invitation of an acquaintance. It was possible to map the WOM process, and identify those elements which activate it. Next, a multilinear regression model and a principal component analysis were built, so as to analyze the influence of network structure in the WOM process, as well as the importance of WOM actors with a real product.

Chapter 5 presents the Network Marketing (NM) model. The final Chapter takes the findings from Chapters three and four (simulation and real data, respectively), along with contributions from the scientific literature, and proposes a NM model. The NM model is split into four parts. The first contextualizes the meaning and background of the main concepts. The second explains the three dimensions proposed: structural, relational, and human. The third refers to the suggested network marketing actors. Lastly, the network marketing strategies which can be applied by entrepreneurs are shown. As a result of this, the final objective of this study is achieved, and so, consequently, is the general objective.

Finally, Chapter 6 presents the discussion, and Chapter 7 summarizes the overarching contribution, suggests practical implications, and proposes potential avenues for future research.

³ Tree of Science could be found in this link: <http://tos.manizales.unal.edu.co>

1. Conceptual Framework

1.1 Introduction

As a research field, entrepreneurship is extensive, and cuts across several disciplines. Despite this, however, its definition is still ambiguous. This investigation will use the classical definition: the examination process of how, by whom, and with what effects are discovered, evaluated, and exploited opportunities to create future goods and services (Shane & Venkataraman, 2000, p. 218). The terms 'entrepreneur' and 'small firm owner' are used interchangeably, to describe someone who manages a small firm (Gilmore, 2011). Thus, the conceptual framework context is from an Entrepreneurial Marketing (EM) perspective. EM has been gaining momentum as an important research topic for entrepreneurs and small firm owners (Whalen et al. 2016). Furthermore, the importance of networking activities within entrepreneurship can be observed in the increasing number of publications from different perspectives (Engel, Kaandorp, & Elfring, 2017). Additionally, the Word of Mouth (WOM) process is both relevant and important on ventures' initial sales (Shim & Bliemel 2017). This Chapter delves into these three concepts, in order to lay conceptual foundations for the thesis.

1.2 Entrepreneurial Marketing

In this section, the EM concept will be explained, by way of a business example and answer the question: how can a small firm compete against giants? Zappos⁴ is a multinational company from the U.S. that is engaged in massive online sales of clothes and shoes. Although Zappos began as a small firm in 1999, ten years later, it was bought by Amazon for \$928 million USD. The founder, Nick Swinmurn, was born in England, and later moved

⁴ The story of Zappos (www.zappos.com) was retrieved from <http://www.businessinsider.com/nick-swinmurn-zappos-rnkd-2011-11>

to California, U.S.A., and obtained a degree in film studies. He then worked at Autoweb.com as a marketing manager. At this job, Nick recognized a fast-growing emerging industry: the Internet. At that moment, his father encouraged him to focus on the shoe industry. Also, Nick, as a shoe consumer, had difficulty finding the same pair of shoes in the same store. Additionally, Nick knew that 5% of all shoes were sold offline catalogs in 1998. However, who was going to buy a shoe over the internet without having tried them on? He later created a web page and sold various units, he reaches an investor and, in 2014, the profits added up to \$54 million USD.

Before explaining the example from an EM perspective, clarification is necessary for various important EM terms. There are several perspectives regarding EM elements or dimensions (Kilenthong et al. 2016), however, in accordance with research which has been carried out on the topic, two elements should be highlighted: Entrepreneurship Orientation (EO) and Market Orientation (MO). EO refers to innovation, risk-taking, and proactive activities. MO focuses on market needs. For example, when Nick was unable to find the right shoes, he identified the need, and thought that others might have the same problem. He learned skills which enabled him to build a web page, and knew that 5% of customers bought their shoes from a catalog. This is market orientation. At the beginning, most people around Nick did not believe in his idea, and so it was risky for him to ask them to invest in the firm.

Although the EM concept emerged from a small firm context (Morris et al. 2002), nowadays, there is a consensus that EM could also be applied for fast-growing firms and large businesses in turbulent environments (Whalen et al. 2016). This focus was chosen for the present thesis owing to the importance of innovative activities in entrepreneurship. Most of the time, owners of small businesses and entrepreneurs do not have adequate resources to carry out sizeable marketing campaigns, and innovation is a good choice to weigh these difficulties.

Therefore, entrepreneurial marketing is a proposal for the solution of the difficulty which ventures or small firms have in the application of traditional marketing concepts (Hills et al. 2008); it is well known that a “small firm is not a small version of a big one” (Hill 2001). To summarize, EM arose from two perspectives: Entrepreneurship Orientation (EO) and Market Orientation (MO). Researchers identified that innovative, risk-taking, and proactive activities expressed the entrepreneurial spirit (Miller 1983). Also, the excessive focus on

market needs represents the entrepreneurship context (Narver and Slater 1990). EM has evolved through time; at the beginning, EM had a proposal for entrepreneurs and small firms. Later, however, Morris et al (2008) identified that EM features had a correlation with performance in large firms. Nowadays, EM is considered to be a good research theory for companies with a high rate of growth and turbulent environments (Whalen et al., 2015). Finally, Whalen et al. (2015) define EM as “... a combination of innovative, proactive, and risk-taking activities that create, communicate, and deliver value to and by customers, entrepreneurs, marketers, their partners, and society at large”.

Finally, EM marketing relies heavily on customer relationship management, and this is important in two types of situations: gathering information from customers, in order to identify new opportunities, and, in the early startup stages, founders should “get out of the building” to create and manage new relationships with customers, in order to test business ideas (Whalen et al. 2016; O'Donnell 2014). The following section of this thesis will present the importance of networking activities in entrepreneurship.

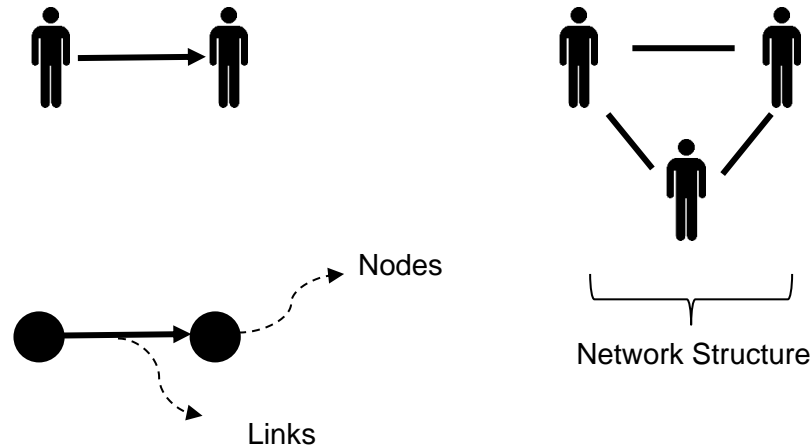
1.3 Networking in Entrepreneurship

Sometimes entrepreneurs need to increase the number of contacts that they have, in order to raise the probability of doing more business or acquiring more investors. In general terms, this process could be considered networking because it implies the implementation of activities which focus on meeting new people. In order to do this, entrepreneurs used to attend social events like business meetings, social clubs, or just social networked. Nowadays, contacting unknown people has become easier, thanks to technologies such as the Internet, Facebook, email, and LinkedIn among others. However, creating quality relationships continues to be an important part of this process.

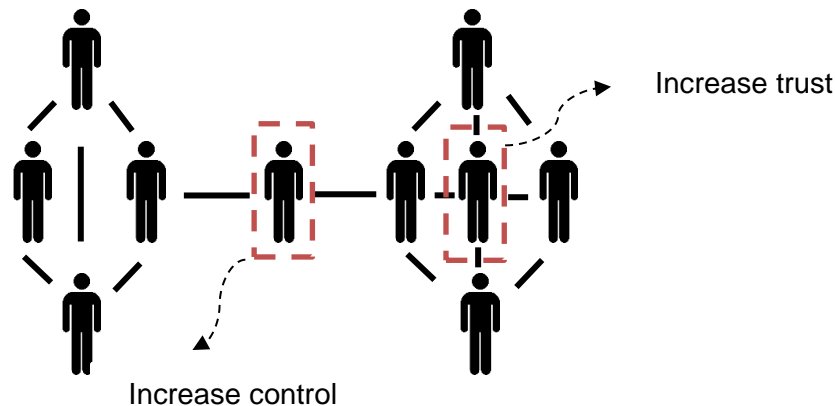
The main objective of networking is to grow entrepreneurial social capital. Social capital refers to resources that (in this context) entrepreneurs can acquire through their social network, for example: money, time, and people (Payne, Moore, Griffis, & Autry, 2011). Social networks consist of a set of nodes (people) and links (the interactions between them) similar to the ones presented in Figure 1-1. From this perspective, social networks are different from online social networks or social networking sites, which include Facebook and LinkedIn (Ellison, Steinfield, & Lampe, 2007). In this study, social networks in which

nodes are people and the interactions between them are the links will be focused upon. The shape generated when several nodes and links are observed is called a social structure (network structure). When an entrepreneur performs networking activities could influence the structure of their social network (Stam, Arzlanian, & Elfring, 2014).

Figure 1-1: Social networks in networking activities



There are metrics which exist for the identification of network features, including size and density. Also, the position of a node in a network could influence its performance or access to information (Figure 1-2). Recently, numerous studies have shown the relationship between network structure and firm performance. For example, Raz and Gloor (2007) show that informal network size has a positive impact on new risk survival. However, structural holes have a negative impact on profit growth. On the other hand, the strength of the relationship, such as strong or weak ties, also influence firm performance. For example, profit from friendship-based strong ties may negatively affect performance (Batjargal, 2003).

Figure 1-2: Type of influence of a node to its network position

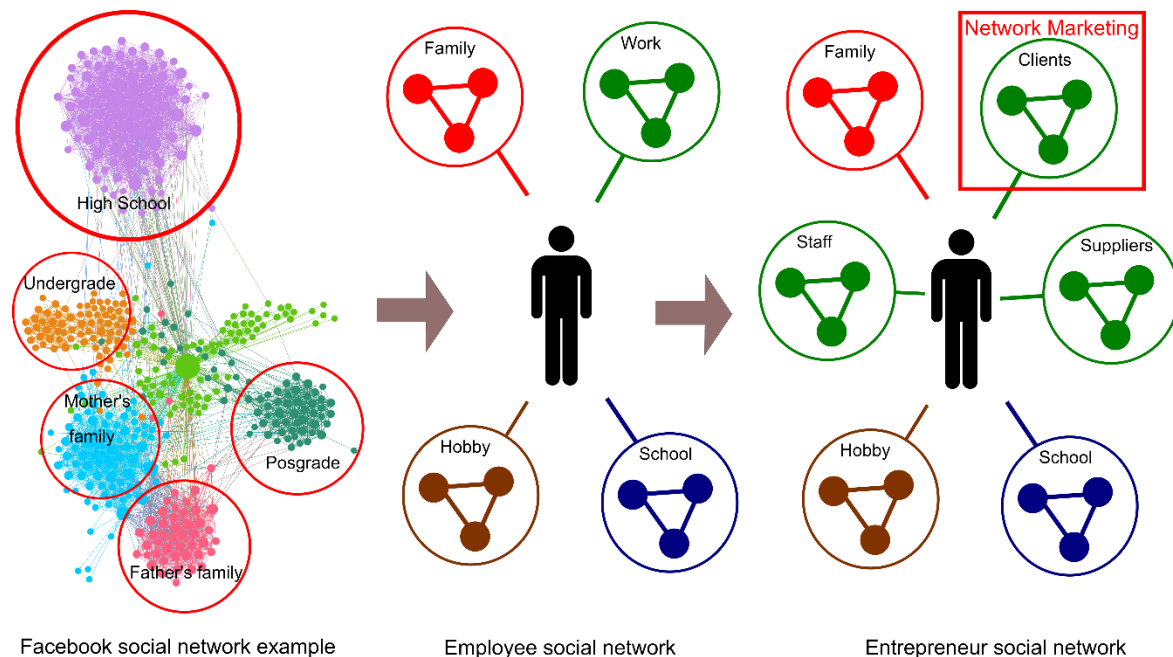
In this study, networking is defined as person-person interaction with a specific purpose. Thus, Woehler’s (2017) definition is relied upon: “...[networking behaviors] as actions intended to develop, change, or leverage interpersonal relationships with potentially instrumental contacts.”. This definition highlights the “getting things done” of relationships. Thus, in an entrepreneurship context, any activity could help business, including, for example, test products or early hypotheses of business models (Whalen et al., 2015). Hence, entrepreneurial networking could be defined as “... what entrepreneurs do in creating and shaping network ties and may, therefore, include tie formation and maintenance behaviors as well as any assemblage of such behaviors into unique networking styles, strategies or processes” (Bensaou, Galunic, & Jonczyk-Sédès, 2014; Porter & Woo, 2015; Vissa, 2012).

According to Robledo et al. (2014), there are four types of networking: innovation, internationalization, financing, and marketing. In this study, marketing activities are focused upon. Marketing Networking or Network Marketing (NM) defines network processes which can be used by small firm owner-managers to manage their marketing activities (Carson et al. 2004). This has been successfully applied in an entrepreneurial context (Carson et al., 2004; O’Donnell 2014; Hakimpour et al., 2011). According to Carson et al. (2004), there are three NM dimensions: structural, relational, and usage. This concept is different from that of multilevel marketing because the NM perspective of is based on the owner or entrepreneur’s point of view, for example, which elements influence the word of mouth process, and which are the best networking strategies to exercise said influence. On the

other hand, multilevel marketing comes from a large firm perspective, for example, which compensation plan or which distribution system should be applied in a firm.

In Figure 1-3, there is an example of a real Facebook user's network structure. This is a similar snapshot of a real social network, and several distinctive groups can be identified: high school friends, university friends, parents' families. This social network will be defined as a structural, static, common network for when someone is an employee. Most of the time, they spend time during the week with their co-workers, and on the weekend, with family and close friends. However, when this person decides to become an entrepreneur, their social network structure changes. Now, they will handle employees (staff), suppliers, investors, and customers, among others. Network activities performed by entrepreneurs in order to acquire and maintain clients will constitute the focus.

Figure 1-3: Change in the entrepreneurial social network structure



This study's principal interest is to identify network characteristics which enable product sales; these are the start of product diffusion processes. Therefore the structural dimension contained in the physical structure of Hoang and Antoncic's networks will play a central part (Hoang & Antoncic, 2003). Key elements which activate and aid the diffusion of products through social networks are analyzed (Chae, Stephen, Bart, & Yao, 2017).

1.4 Word of Mouth Marketing

Word of Mouth (WOM) is the natural process of passing information from person to person by means of oral communication⁵, examples of WOM include storytelling and oral tradition. Compared to traditional marketing, WOM presents benefits such as lower cost, rapid diffusion, and improved customer targeting (Bampo et al. 2008). However, in a marketing context, these kind of processes are more complex (Centola, 2010) because product recommendations are influenced by several variables, including satisfaction and social influence (Bampo et al. 2008; Janssen & Jager 2003). Therefore, Word of Mouth Marketing (WOMM) “is a marketing initiative that aims to trigger a WOM process by targeting a certain number of individuals and incentivizing them to spread WOM” (Haenlein & Libai, 2017).

One example of a WOMM is the campaign created by the company Zappos. Zappos is among the most famous examples of Word of Mouth Marketing campaigns. They did not use mass traditional marketing campaigns such as tv commercials, but focused, rather, on excellent customer service, thus creating a marvelous WOM effect. Three of the key WOMM campaign components are: providing 110% service, convincing top management to invest in providing service directly to customers, and a creating an exceptional service culture. For example, one day, a tourist wanted a pair of shoes, but they were out of stock at that time. An employee then bought them from a brick and mortar store nearby, and delivered them at no extra charge. Additionally, top managers are required to stay at the company call center answering customer calls for four weeks. Finally, Zappos has a free return policy, which means that if a customer wants to return a pair of shoes, they can do so free of charge. Each of these strategies was created with a single purpose: to increase the strength of their relationship with customers, such that they return over and over again, and refer Zappos products to their contacts.

Although WOMM theory is still unstructured, we are going to endure in Haenlein and Libai (2017) proposal. As per Table 1, they defined three program archetypes: seeding programs, referral programs, and recommendation programs. This theoretical framework was selected because contains the main WOMM streams, and the authors are well-known in

⁵ Source: Wikipedia https://en.wikipedia.org/wiki/Word_of_mouth

this field. Also, it is important to highlight actors involved in WOM process. According to the literature, these are influencers, opinion leaders, revenue leaders, and hubs. Influencers are a minority of people who influence a great number of their peers (Watts & Dodds, 2007). Opinion leaders are defined as consumers who exert a disproportionate influence on those around them (Moldovan et al. 2017) and have expertise on a topic. Revenue leaders are high-value customers. Finally, hubs are people with a large number of social links (Goldenberg et al. 2009).

Table 1-1: Major types of WOM programs

Program archetype	Program form	Description
Seeding programs	Product seeding	Accelerate the overall adoption of a wider group by getting a (typically new) product into the hands of a small group of people (the “seeds”)
	Viral Marketing	Encourage the seed individuals to share and spread a marketing message via electronic channels
Referral programs	Referral reward	Incentivize existing customers (mainly in B2C settings) to make product recommendations by providing rewards which depend on turning a referral into a sale
	Business reference	Use references from a client firm in a B2B setting when trying to influence specific potential customers favorably to become new customers
	Affiliate marketing	Pay a monetary incentive (based on sales of clicks) for referring a person to a certain site via online links
Recommendation programs	Narrowband recommendations	Encourage recommendations through a specific individual’s social network (e.g. Facebook)
	Broadband recommendations	Encourage recommendations through dedicated (review) sites (e.g. TripAdvisor, Amazon)

Source: Haenlein & Libai (2017)

Another stream which has become popular recently is electronic WOM (eWOM) (Babić Rosario, Sotgiu, De Valck, & Bijmolt, 2016). The increasing number of internet options to share customer opinions (e.g., reviews or tweets) represents a new opportunity to understand WOM in an electronic context (Bao & Chang, 2014). However, some authors integrate eWOM into WOM theory, highlighting the importance of offline conversations (Dubois, Bonezzi, & De Angelis, 2016). This thesis will assist understanding of the WOM process in an offline stage, in an EM context.

According to Robledo et al. (2013), there are three key elements which activate the WOM process: WOM actors, critical mass, and social influence. WOM actors are defined above. Critical mass refers to a group of customers which is needed in order to ignite the WOM process. Finally, social networks can influence customer behavior. For example, if a client has a lot of friends who use the same product, this networking process will influence their decision-making process (Janssen & Jager, 2001).

2. Literature review

2.1 Introduction

The purpose of this Chapter is to identify the main contributions of Entrepreneurial Marketing (EM), networking, and Word of Mouth Marketing (WOMM), and also to recognize the bridges between these three branches of research, and addresses the hypothesis of this thesis. In order to do this, Tree of Science (ToS) is used, as is a Web of Science (WoS) search. Thus, each topic is distributed in the roots, trunk, and leaves. Roots show the emergence of the topics, the trunk shows publications which create structure, and leaves represent the current literature. Finally, at the end of each topic, the reader will find the hypothesis of this thesis.

Specifically, the first part of the Chapter defines the concept of entrepreneurial marketing. Although in recent years, EM has become an important discipline among researchers and entrepreneurs, there are still numerous gaps in its definition and in its entrepreneurial applications (Marin, Robledo, Duque-Méndez, 2017). The first section of this Chapter follows the chronological evolution of EM as a research topic, the marketing and entrepreneurship interface, its current definitions, and three main branches: effectuation, social media marketing, and networking. This thesis will focus on networking activities from an EM perspective.

The second part is about networking, and its contributions from the marketing and EM perspectives. In this section, the reader will find the principal contributions to this topic, along with a number of proposal models. For example, in previous research, four ways to use networking in an entrepreneurial context are identified: innovation, internationalization, financing, and marketing (Robledo et al., 2014). The focus of this thesis is marketing. Next, two previous proposals for network marketing are explained: marketing networking (Carson et al. 2004) and the strategic network marketing model (Jones et al. 2013).

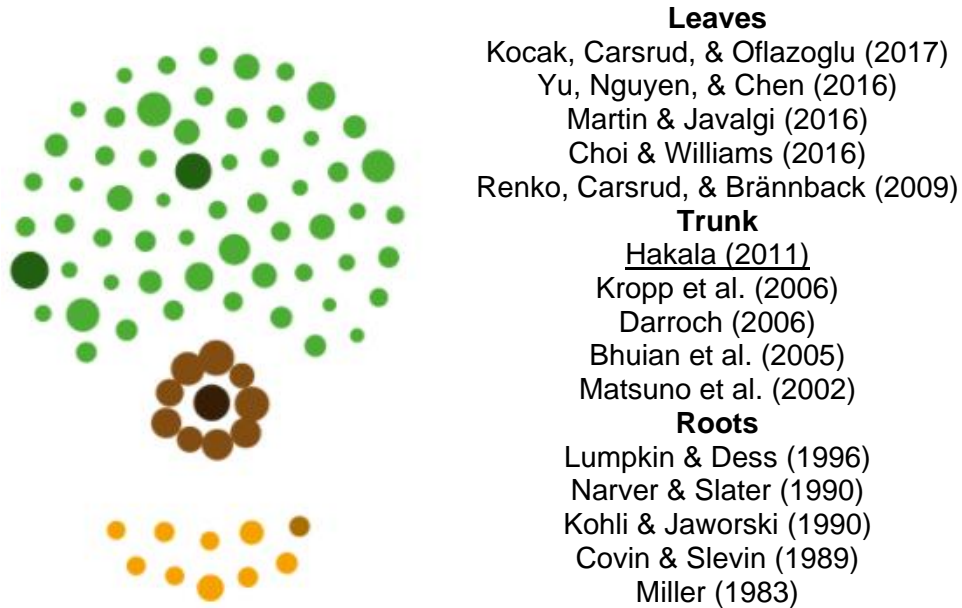
In the third section, we will review the main contributions to WOMM. According to Robledo et al. (2013), there are three elements which activate WOM process: network structure, WOM actors, and critical mass. In this study, the first two elements will be key.

2.2 Entrepreneurial Marketing

Entrepreneurial Marketing (EM) has increased in popularity as a unique school of thought (Whalen et al., 2015). EM comes from the interface between the Entrepreneurial Orientation (EO) and Marketing Orientation (MO) perspectives (Hills et al., 2008). Companies with EO are more innovative, proactive, and have a higher propensity for risk taking (Miller 1983). Otherwise, MO has two different approaches: behavioral (Kohli and Jaworski, 1990) and cultural (Narver and Slater, 1990). The behavioral perspective uses market intelligence, rather than customer focus, as its central element (Kohli and Jaworski, 1990). In contrast, the cultural perspective identifies three behavioral components: customer orientation, competitor orientation, and interfunctional coordination (Narver and Slater, 1990). Initially, EM was created as a marketing strategy for Small Medium Enterprises (SME) and ventures (Morrish et al., 2002), owing to their lack time, marketing resources, and knowledge (Dragnic, 2009). Further, Miles and Darroch (2006) showed how large firms can both gain and renew competitive advantages, through use of EM processes. Nowadays, EM is also well-known as a marketing strategy for fast-growing companies in turbulent contexts (Miles et al., 2015).

In order to identify EM literature, the words: “entrepreneurial marketing” were used in the title. The results contained 148 records, and the search was carried out on July 4, 2017. Next, results were uploaded to ToS (www.tos.manizales.unal.edu.co), in order to generate the Tree of Science (ToS) for EM presented in Figure 2-1. The purpose of ToS is to kickstart researchers with a group of important and relevant papers. Thereafter, however, different methodologies, such as systematic or narrative reviews should be used, in order to enrich the discussion.

Figure 2-1: Tree of Science for Entrepreneurial Marketing



The articles located in the root of “Tree of Science” are seminal, and formed the basis of EM. EM was built using the Entrepreneurial Orientation (EO) and Market Orientation (MO) theories. EO considers the proclivity of a company to look for opportunities in new markets (Lumpkin & Dess, 1996). On the other hand, there are two classical definitions for MO: "the organization-wide generation of market intelligence, dissemination of the intelligence across departments and organization-wide responsiveness to it" (Kohli & Jaworski, 1990), and "the organization culture that most effectively and efficiently creates the necessary behaviours for the creation of superior value for buyers and, thus, continuous superior performance for the business" (Narver & Slater, 1990). Table 2 highlights the EM concept over time and inconsistency still remains.

Table 2-1: The various definitions of Entrepreneurial Marketing over time

Definitions of entrepreneurial marketing	Source
“proactive identification and exploitation of opportunities for acquiring and retaining profitable customers through innovative approaches to risk management, resource leveraging and value creation”	Morris et al. (2002)

<p>“EM is a spirit, an orientation as well as a process of passionately pursuing opportunities and launching and growing ventures that create perceived customer value through relationships by employing innovativeness, creativity, selling, market immersion, networking, and flexibility”</p>	<p><u>Hills & Hultman (2011)</u></p>
<p>“EM is a combination of innovative, proactive, and risk-taking activities that create, communicate, and deliver value to and by customers, entrepreneurs, marketers, their partners, and society at large”</p>	<p><u>Whalen et al. (2016)</u></p>

Also, Miller (1983) proposed that EO depended on the nature of the firm, and identified three characteristics for these types of firms: focus on innovation, risk-taking, and proactiveness. Covin & Slevin (1989) confirmed these results, and showed that small firms have better performance in hostile environments when an EO is applied. Narver & Slater (1990) focused on MO, and showed that a firm with an MO strategy has increased profitability. Kohli & Jaworski (1990) proposed a theoretical framework for MO which is later validated by the performance of a firm (Jaworski & Kohli, 1993).

In the trunk, articles are found on the topic of EO and MO, linking these two fields with performance, thus constituting the beginning of EM. For example, Matsuno et al. (2002) investigated whether a firm with EO and MO would have high performance. They merged the two orientations, and the results were that EO had a positive relationship with MO, as well as a positive influence in firm performance. However, Bhuian et al. (2005) showed that a firm with high MO and moderate EO will have increased business performance. Other approaches, such as that of Miles and Darroch (2006), who investigated the connection between EM and competitive advantages in large firms, and the results showed a positive relationship between the two. This results have been confirmed in various institutional environments (Li et al., 2008). Kropp et al. (2006) analyzed the correlation between International Entrepreneurial Business Ventures (IEBV) and EO, MO, Learning Orientation (LO), and communications. The results contained in said publication showed a positive relation between IEBV and EO, MO, and LO, but not with communications. However, a misunderstanding about the relationships between technology, entrepreneurship, and learning orientation remains (Hakala, 2011).

Nowadays, EM faces changing and turbulent environments, for example, new, emergent technologies, such as the Internet of Things (Yu, Nguyen, & Chen, 2016). Innovation has

become one of the pillars of EM. With access to new technologies, entrepreneurs can cause radical innovations, and impact firm performance (Kocak, Carsrud, & Oflazoglu, 2017; Renko, Carsrud, & Brännback, 2009). Moreover, in the manufacturing industry, technology has a stronger mediating effect than do marketing activities (Choi & Williams, 2016). However, the increasing number of entrepreneurial firms is generating more competitive intensity within International New Ventures (INVs) (Martin & Javalgi, 2016), and companies are increasingly being oriented towards research (Ahmadi & O’Cass, 2016; Baglieri & Lorenzoni, 2014).

New elements have emerged in EM, including the importance of Learning Orientation (LO). A number of studies have shown that LO works as an intermediary, through which the MO is created to improve, and the EM is complemented in terms of performance. However, although EO has a positive effect in emerging markets, brand orientations have the opposite effect (Reijonen, Hirvonen, Nagy, Laukkanen, & Gabrielsson, 2015). Not only market turbulence, but also culture have a mediatic effect on EO, for example, individualistic cultures tend to use EO more frequently (Engelen, Schmidt, & Buchsteiner, 2015).

According to our literature review, three main future EM perspectives were found: effectuation, social media marketing, and networking activities.

2.2.1 Effectuation

Effectuation logic has become a widely-accepted theory in EM (Whalen et al., 2016; Yang & Gabrielsson, 2017). The effectuation model was introduced by Sarasvathy (2001) when she realized that 89% of entrepreneurs were using effectuation more than causation (the opposite was thought at the time). Entrepreneurial experts do not begin with brilliant ideas; they start with three premises: who they are, what they know, and who they know. Therefore, effectuation is defined as “...a way of thinking that serves entrepreneurs in the processes of opportunity identification and new venture creation.” (Sarasvathy and Dew 2005). The principles of effectuation are the following: bird in hand, the affordable loss principle, crazy quilt, lemonade, and pilot-in-the-plane.

Some current effectuation studies show important elements, such as a broadening of the notion of affordable loss to include social impact, for example, status and reputation (Daniel,

Domenico, & Sharma, 2015). Also, sensemaking theory (enactment, selection, and retention), familial influences, and experimental learning have been added to the concept of effectuation (Cai, Guo, Fei, & Liu, 2017; O. Jones & Li, 2017). Finally, networking has become an integration point for effectuation theory (Galkina & Chetty, 2015).

2.2.2 Social Media Marketing

Another stream of EM is Social Media Marketing (SMM)⁶. New social networking sites, such as Facebook and Twitter have become an essential tool for daily entrepreneurial use (Eggers, Hatak, Kraus, & Niemand, 2017). For example, the positive influence of SMM on WOMM in an EM context, and the new skills that entrepreneurs should acquire to implement them showcase the importance of social media (Jones 2010). On the other hand, SMM offers opportunities, specifically to ethnic minority entrepreneurs, to improve their resources for product marketing (Anwar & Daniel, 2016). However, this branch still requires further research (Jones 2010; Alford and Page 2015).

2.2.3 Networking in entrepreneurship

The importance of social relationships in entrepreneurship is well-known (Bocconcelli et al. 2016). Through these, entrepreneurs can access financial and non-financial forms of capital (Nordin et al. 2017). Therefore, networking is considered to be a useful tool, which adds value to business activities, in order to expand the firm (Gilmore et al. 2006). From an EM perspective, EO and MO both influence performance, and vary with different levels of network ties (Boso, Story, & Cadogan, 2013). Also, Morgan et al. (2016) show that firm market power and EO are positively related to network opportunism. This study will focus on the EM networking stream, and the next section expands this topic.

2.3 Marketing by networking

The first definition of networking encountered by the authors in an EM context was “...an activity in which the entrepreneurially oriented SME owners build and manage personal relationships with particular individuals in their surrounding” (Carson et al. 1995, p. 201).

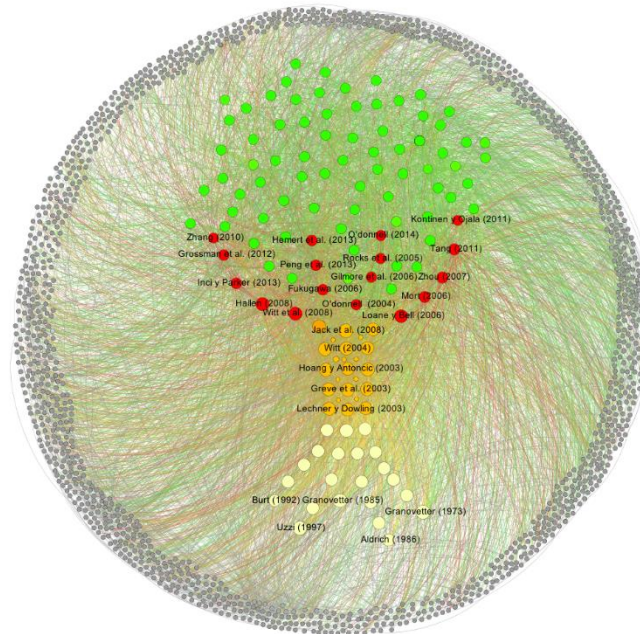
⁶ An SMM campaign was designed for ToS and implemented. Said work can be found at: <http://www.bdigital.unal.edu.co/54151/1/24339462.2016.pdf>

Also, it is an action in which SME owners do business in all types of industries (O'Donnell, 2004). Furthermore, the importance of networking lies in its ability to increase innovation (Eggers et al. 2014), acquisition of marketing information (Mbura, 2014), and firm performance (Naudé et al. 2014). In order to explain their understanding of networking, O'Donnell (2004) proposed three dimensions: the level of networking, networking proactivity, and the strength of the network tie. Also, according to Robledo et al. (2014), networking in SMEs encompasses four areas of action: internationalization, financing, innovation, and marketing. The last is the focus of this study, as networking appears to be the link between EM and the entrepreneur's active role (Zontanos and Anderson, 2004). In EM literature, this link has been given several names, including: "Entrepreneurial Marketing by Networking" (Gilmore & Carson, 1999) or "Marketing Networking" (Carson, Gilmore, & Rocks, 2004).

One challenge for entrepreneurs is the determination of how the performance of networking activities could influence their firms' success or failure (Torkkeli et al. 2016). Ahuja et al. explain that "...choosing or not choosing to establish connections with certain other actors in their networks, by forming or dissolving network links, or by strengthening or weakening relationships" (2012:438). These attempts to develop and change one's relationship network structure have been conceptualized and studied as "networking" (Thornton et al. 2014). Various studies suggest that these actions have a strong influence on firm performance (Yun and Park 2016).

Networking could be considered a tool for entrepreneurs and small firm owners (Hoang & Antoncic, 2003). Additionally, networking is an important tool, which improves entrepreneurial marketing effectiveness (Shaw, 1999). Moreover, networking helps entrepreneurs or small firm owners to innovate in products, internationalization, financing, and marketing processes as is presented in Figure 2-2 (Robledo et al., 2014). The literature proposes that personal networks can positively impact the marketing effectiveness of entrepreneurs and small firm owners (Shaw, 1999).

Figure 2-2: Tree of Science for networking in entrepreneurship. The four branches (red circles) represent the different perspectives: innovation, internationalization, financing, and marketing.

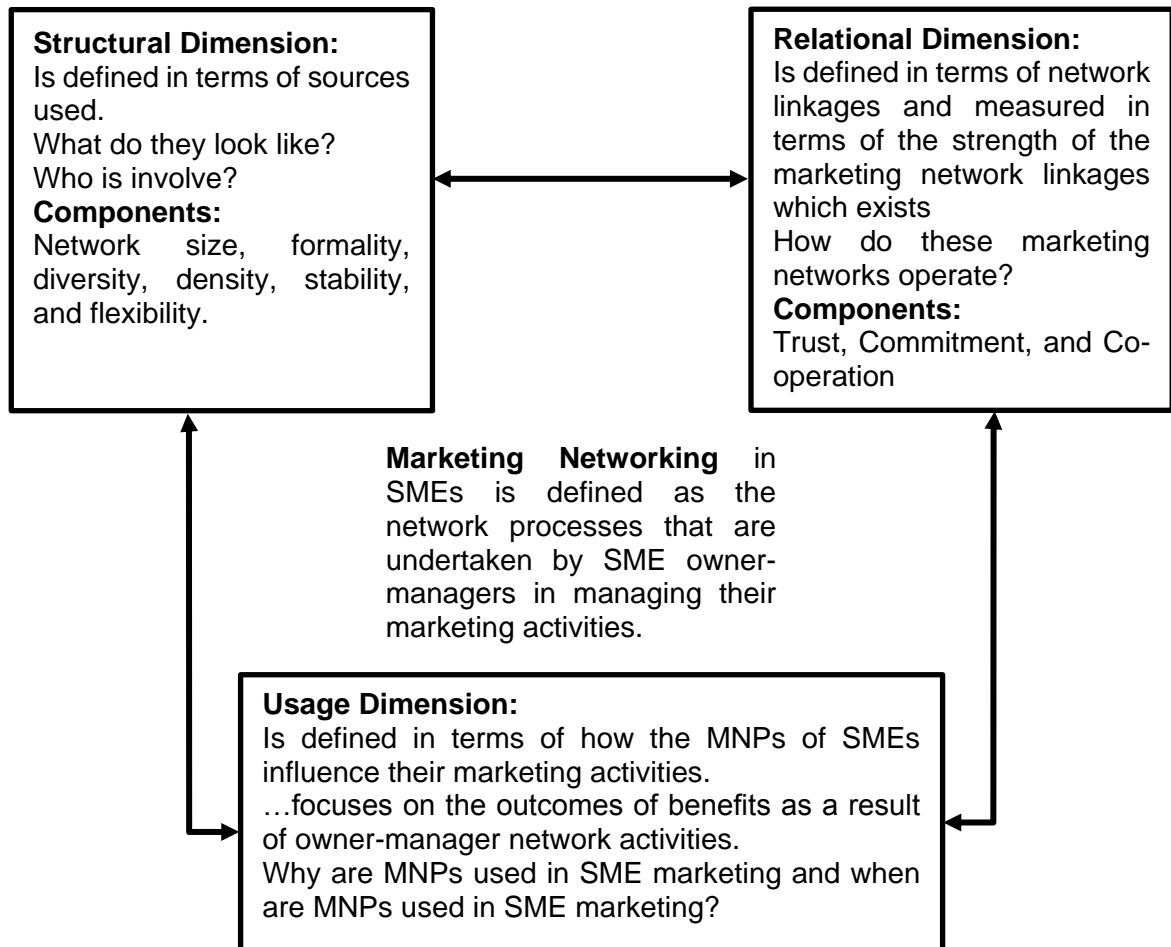


Source: Robledo et al. (2014)

While there are very few studies which examine the relationship between networking activities and sales firm performance, current research provides certain frameworks to conceptualize a Network Marketing Model. In accordance with the author's research, two proposals have been identified, and will be explained below.

2.3.1 Marketing networking

The concept of Marketing Networking (initially called "Marketing by Networking") was defined as "...a naturally inherent aspect of entrepreneurial decision-making in which entrepreneurs exchange and seek ideas, knowledge, and market-related information through their business activities and contacts" (Gilmore & Carson, 1999b). However, later the name was changed to "Marketing Networking" (Carson et al., 2004). Carson et al. (2004) defined the three dimensions of network marketing: structural, relational, and usage.

Figure 2-3: Marketing Network Process (MNPs)

Source: Adapted from Carson et al. (2004)

The structural dimension refers to the understanding of the network structure (links and nodes). Thus, it refers to the interactions between nodes and their components. Carson et al. (2004) defined six components: network size, formality, diversity, density, stability, and flexibility (Figure 2-3). Those concepts come from the social network analysis literature. For example, network size is the number of direct contacts used by the owner, in order to aid them in their marketing.

The relational dimension considers the interactions between the owner-manager and their network sources. According to the SNA literature, this constitutes the strength or the link, which may be strong or weak (Granovetter, 1977). However, the perspective of Carson et al. (2004) focused on developing the governance concept (Hoang and Antoncic, 2003).

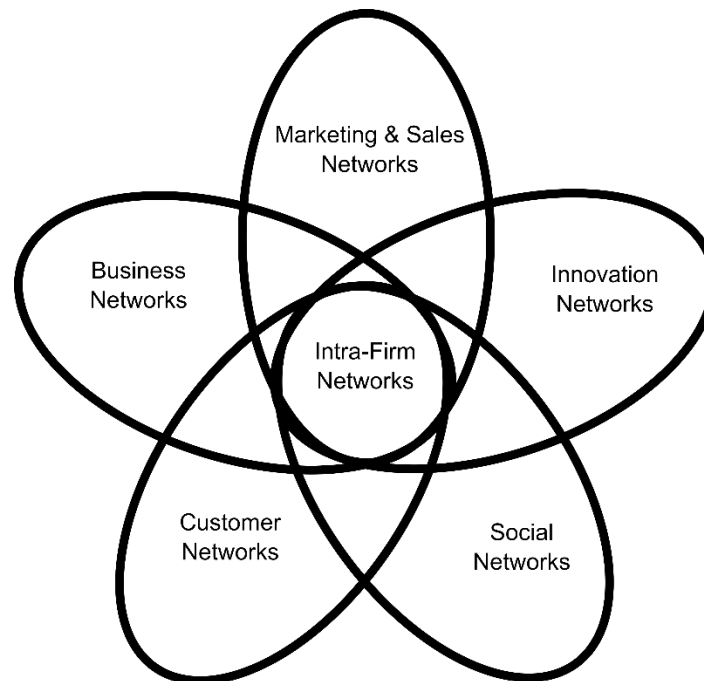
Carson et al. (2004) proposed three components from the relational dimension: trust, commitment, and co-operation.

The final dimension is usage. The usage dimension refers to the propensity of the owner to use marketing networks in their marketing activities. Although there are many marketing activities which can be supported by networking, they select the following: managing product decisions, managing promotional activity, planning marketing activities, managing pricing, managing distribution, acquiring marketing resources, increasing market knowledge, and marketing innovation.

2.3.2 Strategic network marketing model

The Network Marketing proposal below is the Strategic Network Marketing Model (SNMM) (Jones, Suoranta, & Rowley, 2013). They applied semi-structured interviews with managers and employees, providing a setting in which participants could discuss their answers in depth. The SNMM was generated from a range of different types of networks in small software technology firms (the type of networks are shown in Figure 2-4). The six types of networks are as follows:

1. Intra-firm networks: the social network of employees within the firm.
2. Social networks: relatives, friends, and acquaintances of firm employees.
3. Customer networks: client social networks.
4. Business networks: people and firms that support the business, for example: banks and lawyers.
5. Innovation networks: other institutions, such as universities.
6. Marketing and sales networks: people and firms that support the marketing and sales process.

Figure 2-4: The Strategic Network Marketing Model (SNMM)

Source: Jones, Suoranta, & Rowley (2013)

The focus of this thesis is on customer networks. According to Jones et al. (2013), customer networks highlight word-of-mouth recommendations from customers (customer referrals). Therefore, based on the network marketing proposals above, a contrast of the elements which activate the diffusion process (WOM sales) using network strategies is expected, in order to then propose a model, based on the results: **Network Marketing (NM) as a WOMM strategy in Entrepreneurial Marketing (EM).**

2.4 Word of Mouth Marketing

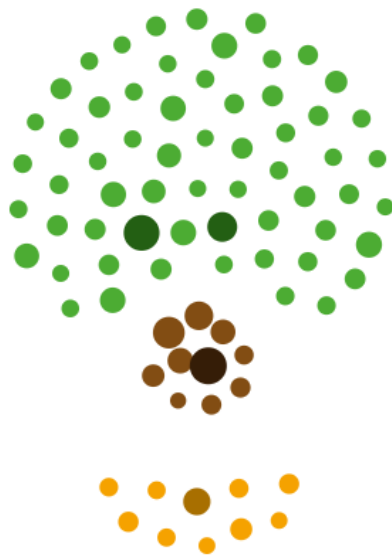
It is well known that networking is an essential tool of marketing for entrepreneurs and small business owners (Slotte-Kock & Coviello, 2010). Most of the time, they are in a context which lacks resources such as time, money, and knowledge (Dragnic, 2009). Therefore, they should start sales with their own personal network, and later attempt to activate the word of mouth process (Stokes & Lomax, 2002). This is an important topic because sales in entrepreneurship should not depend on the capacity of the owner, as this will raise their probability of failure. Hence, it is relevant to analyze elements that could activate word of mouth in a market, and propose a conceptual model for entrepreneurs, so as to facilitate and improve their sales.

WOMM has increasingly been shown to have an influence on consumer buying decisions. For example, Nielsen's online Harris Poll conducted a survey of 2,000 Americans about WOMM, and 82% of them sought recommendations from family and friends⁷. Additionally, two-thirds said that they were at least a little more likely to buy a product after a friend or family shared it via social media or email. Moreover, 95% of millennials would be in favor of benefits for sharing products via social media. However, 77% said that they would prefer cash for referring a product to a friend. This shows that, WOMM is a natural strategy for the promotion of products to consumers.

Additionally, Word of Mouth (WOM) is one of the most powerful marketing strategies (Berman, 2016). WOM can build brands, drive sales, and spark consumer-consumer and consumer-brand conversations (Trusov et al., 2009). WOM increases if customers are more interconnected, for example, through social media (Tang, 2017). Also, WOMM refers to any business action that earns customer recommendations. Some business actions could include delivering the best product, providing a great customer experience, or rewarding customer loyalty (Schmitt, Skiera, & Van Den Bulte, 2011). Recommendations are important for companies because they indicate client preference, which leads to customer purchases and results in a strong probability that they will tell others (Reimer & Benkenstein, 2016).

As in the first part (EM), in order to identify the seminal papers on WOMM, a WoS search was performed on July 4, 2017, with these word sets: 'marketing' (title), and 'word of mouth' (topic), and 306 results were found. Next, the txt file was uploaded to ToS (tos.unal.edu.co). The WOMM Tree of Science WOMM can be found in Figure 2-5.

⁷ Retrived from: <https://www.getambassador.com/blog/how-are-consumers-influenced-by-referral-marketing>

Figure 2-5: Tree of Science of Word of Mouth Marketing (WOMM)**Leaves**

Godes (2016)
 Babić Rosario et al., (2016)
 Jiang et al., (2016)
 Liu et al., (2015)
 Hennig-Thurau et al. (2015)

Trunk

Hinz et al. (2011)
 Kozinets et al. (2010)
 Trusov et al. (2009)
 De Bruyn & Lilien (2008)
 Hill et al. (2006)

Roots

Brown and Reingen (1987)
 Rogers (1983)
 Bass (1969)
 Arndt (1967)
 Katz and Lazarsfeld (1955)

The bases of Word of Mouth Marketing (WOMM) are established in the diffusion of innovations (Rogers, 1983; Bass, 1969). Diffusion of innovations is the process by which an innovation is communicated, over time, among members of a social network (Rogers, 1983). One of the main topics in WOMM is the role of the influence of people on the flow of information spread (Katz & Lazarsfeld, 1955) and the favorable comments that aids in the acceptance of a new product (Arndt, 1967). Additionally, WOMM relies on the social network structure, and so the network features may increase or decrease the WOMM effect (Brown & Reingen, 1987). Following the internet boom, WOMM increased in popularity because customers were able to share and read product reviews (e.g. Amazon) (Dellarocas 2003; Henning-Thurau et al., 2004; Chevalier, 2006). Therefore, because of message traceability on the Internet, it became easier to measure WOM communications (Godes & Mayzlin, 2009) and to understand dynamic patterns (Liu & Yong, 2006).

Later, the question was: What are the best WOMM strategies? In order to answer this question, some researchers focused on the importance of referrals and the importance of peer-to-peer (De Bruyn & Lilien, 2008) and their influence on new customer acquisition (Trusov et al., 2009). Additional Hinz et al. (2011) showed that a WOMM strategy focus on well-connected people was eight times more successful, and Kozinets et al. (2010)

described a networked narratives strategy which amplified marketing messages. Finally, Hill et al. (2006) proposed network based marketing, in order to increase brand recognition and profit, by taking advantage of client social networks.

Nowadays, research on WOM is focused on electronic Word of Mouth (eWOM). For example, when multiple brands face online competition, eWOM has a significant effect on the online shopper's decision (Jiang, Tadikamalla, Shang, & Zhao, 2016). Additionally, eWOM is positively correlated with sales, but its effectiveness differs across product platforms and metric factors (Babić Rosario et al., 2016). Moreover, Hennig-Thurau et al. (2015) showed that the information produced by online forums like Twitter is influential on media products. Similarly, Online Social Networks (OSN) has become a relevant topic in eWOM (Liu et al., 2015). Because of this, important research topics are now emerging, such as the importance of product quality (Godes, 2016; Yoo, Kim, & Sanders, 2015), positive and negative comments on the retransmission process (Baker, Donthu, & Kumar, 2016), and the importance of shared content. Finally, the challenge for WOM researchers is to find the relevant metrics for the improvement of marketing strategies (You, Vadakkepatt, & Joshi, 2015).

Another important topic is the effect of negative Word-of-Mouth (nWOM). nWOM has a stronger influence than positive WOM (pWOM) on sales (Chen, Wang, & Xie, 2011). For example, an investigation on quality impact in a video-on-demand product showed that nWOM was twice as effective as pWOM. (Nam, Manchanda, & Chintagunta, 2010). Also, even for successful dental goods, about 20% of the customers refused them due to nWOM received from specialists (Leonard-Barton, 1985). However, nWOM has a different impact, depending on the type of social network (Relling, Schnittka, Sattler, & Johnen, 2016). As a result, more research is necessary for improved understanding of the impact of nWOM on marketing programs (Relling et al., 2016).

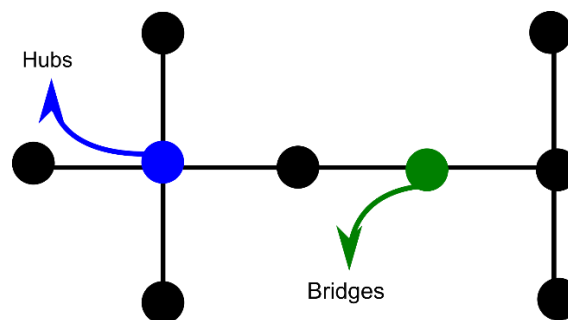
According to Robledo et al. (2013), there are three main factors which influence WOM process: WOM actors, network structure, and critical mass. In the next section, the first two concepts will be introduced.

2.4.1 Word of Mouth actors

There is a growing tendency in the literature regarding the importance of the different WOM actors. However, there are still conflicts with respect to their definitions and impacts on the diffusion process. Moreover, it is a challenge to identify the specific clients who have the most influence in their social network (Roelens et al., 2016). In this section of the thesis, some of the main WOM actors (hubs, influencers, opinion leaders, and revenue leaders) will be shown, and their influence on the WOM process will be detailed.

First of all, hubs are people with a large number of relationships (Goldenberg, Han, Lehmann, & Hong, 2009). From the social network perspective, they are highly connected nodes or with a high degree. Also, they are important in the diffusion and adoption process because they receive information sooner, and can predict the success of a product (Hinz et al., 2011; Katona, Zubcsek, & Sarvary, 2011). Furthermore, according to Goldenberg et al. (2009), innovative hubs have a better impact on the adoption process, and follower hubs have a better impact on market size. However, if hubs increase their number of friends, their influential power decreases (Katona et al., 2011), and so, they do not have elevated influence on their peers (Hinz et al., 2011). Furthermore, heterogeneity in their attributes and the nature of connectivity significantly impact social diffusion (Hu, 2013). Also, markets with greater social influence are more uncertain for hubs (Delre, Jager, Bijmolt, & Janssen, 2010). Some studies propose another type of hubs: bridges (an example of them can be found in Figure 2-6). Bridges are nodes with high levels of betweenness, and therefore, can control the flow of information between groups (Burt 2004). However, bridges had quite a small influence on the diffusion process (Hu, 2013; Pescher & Spann, 2014), and were difficult to identify (Pescher and Spann 2014).

Figure 2-6: Example of hubs and bridges in a social network.



Some studies have shown that hubs are not necessarily better, because of the maintenance cost of having a large number of relationships (Katona et al., 2011; Smith, Coyle, Lightfoot, & Scott, 2007) and also owing to the nature of the relationships, such as type and duration (Chen, van der Lans, & Phan, 2017). Moreover, there are important circumstances in which the best spreaders do not correspond to the most connected or central people (Kitsak et al., 2010). Sometimes a big seed strategy with hubs is not required. Actually, it can better to start with customers who have strong links with the firm (Liu-Thompkins, 2012). There are people who are in closer touch with innovations, and have a disproportionate influence on others' adoption thereof: influencers or influentials (Van den Bulte & Joshi, 2007). For example, Liu et al. (2015) proposed a research framework including the dimensions of trust, domain, and time, in order to identify influencers. Elements such as trust and domain knowledge are important in order to understand the behaviors of influencers. There are several studies which propose to identify influencers from Online Social Networks (OSN) (Kiss & Bichler, 2008; Lu, Li, & Liao, 2012; Zhang, Wang, & Xia, 2010). However, the focus of this thesis is to understand WOM actors from an offline social network perspective.

Although there is a great deal of research about hubs, they are not the only WOM actors. Others include influencers⁸, people with disproportionate influence on others' purchases (Liu-Thompkins 2012; Godes and Mayzlin 2009). In contrast to the case of hubs, trust and topic dominion play an important role with influencers (Roelens et al. 2016; Liu et al. 2015). Moreover, sometimes high degree exerts little influence, and face-to-face interactions play a critical role in this process (Chen et al. 2017). For example, when doctors recommend a medicine to their patients, or when travel agents suggest a vacation place to their customers, they generate a higher impact in the buying decision process because of influencer knowledge, and not for their degree. Therefore, influencers are associated with prestigious remembers who have useful information (Lu et al. 2012).

On the other hand, opinion leaders are similar to hubs because they have a high degree. However, the nature of their links are different: people know them, but they do not know said people. Similarly, opinion leaders are important because of their capacity to inform,

⁸ Influencers are also called influentials (Van den Bulte & Joshi, 2007). However, in this study they are referred to as influencers.

but not for their strong persuasive power (Delre et al. 2010). Some classic examples of these include politicians, journalists, sports stars, celebrities, and Hollywood stars. They can demonstrate how to use a product, this and will influence the decision process of potential customers. In the academic literature, there are two ways to identify opinion leaders: by self-reporting and degree centrality (Risselada et al. 2015). However, self-reporting indicates opinion leadership only with strong links.

Although the importance of hubs, influencers, and opinion leaders is well-known, there is a limitation to their identification due to the lack of data about their social networks (Haenlein and Libai 2017). In order to tackle this problem, some researchers have proposed targeting high-value customers, or revenue leaders (Haenlein 2011; Haenlein et al. 2013). The term 'revenue leaders' refers to customers who generate high profitability for the company through customer purchases throughout the entire future relationship, called the Customer Lifetime Value (CLV) (Gupta et al., 2006). This type of WOM actors has been shown to be of value, not only because of profit, but also owing to their influence over the right consumers (Haenlein 2011). Revenue leaders bring value to the firm because they are easy to identify and use as the center of WOMM campaigns.

Sometimes the limits of each other WOM actors are very thin, so one of the purposes of this thesis proposes a framework to identify them in an Entrepreneurial Marketing context. However, one of the challenges is to identify them in this contexts because of sometimes popular users are not influentials. Therefore and based on our rationale, we formulate the next hypothesis:

H1: WOM actors influence WOM processes in an EM context

2.4.2 Network structure

The influence of the network structure (interactions between nodes and links) exists when clients determine the usefulness of a good, based on the number of other customers who are their friends (Goldenberg et al. 2010). Examples of network effects may be found in innovation (Fritsch and Kauffeld-Monz 2010), knowledge transfer (Reagans and McEvily 2003), team performance, and leadership (Mehra et al. 2006). Moreover, the network effects in marketing research have shown an influence in the customer ideation process, when they are in highly interconnected networks (high clustering coefficient) (Stephen et

al. 2016). Additionally, some studies propose that this effect drives faster market growth (Doganoglu and Grzybowski 2007). However, further studies present that this a negative effect on product introduction because of the chilling effect: “wait and see” (Goldenberg et al. 2010). Therefore, it is important to understand network effects in an EM context.

Here, it is argued that the topology of the network is different from the network structure. Network topology refers to the effect of several network structures and relational heterogeneity in the WOM process, within market networks (Bohlmann et al. 2010). Additionally, it shows the different degree distributions, such as those of Erdos-Renyi, Newman-Watts-Strogatz, Watts-Strogatz, or Barabási-Albert (Mukherjee 2014; Ahn et al. 2007).

Properties such as clustering or Interpersonal Closeness (IC) influences the WOM process between senders and receivers. A positive WOM is influenced by the type of relationship. When there is a close relationship, people tend to speak negatively, in contrast to positive relationships (Dubois et al. 2016). Moreover, the personal social network of a customer is a good indicator for the prediction of future purchases (Verbraken et al. 2014). Network structure sometimes decreases the adoption speed of new products (Mukherjee 2014). However, it tends to generate higher revenues (Barrot et al. 2013). Consequently, network structure is likely to have an effect on the WOM process. We formulate the next hypothesis:

H2: Network structure influences WOM processes in the EM context

3. Do marketing networks really help startups? Simulating sales through Agent-Based Modeling (ABM) and complex networks⁹

3.1 Introduction

In this study, the aim is to assess the usefulness of networking as a marketing tool for small firms, and thereby shed more light on the contradictory research results mentioned above. Therefore, the ABM is applied, so as to model and simulate small firms' social network processes, and to investigate whether different network characteristics impact product marketing, and how. First, a Network Marketing (NM) model for small firms is proposed. Thereafter, the impact of network density and size on sales is analyzed by way of a simulation with agent-based modeling. Finally, four marketing networking strategies are created and evaluated in the simulated market. This document concludes with the results of said analysis.

Nowadays, it is challenging for a single entrepreneur to induce and activate networking processes, as success often requires cooperation between players and corporations (Story, Hart, & O'Malley, 2009). In this regard, several studies have shown ambiguous results between business success and network characteristics (Semrau and Werner, 2014). Regarding network size, the number of actors within a network, Raz and Gloor (2007) found that the size of informal networks between firms has a positive impact on the development of new companies. Batjargal (2005) showed that there is no correlation between network size and company growth. Regarding network density, or the number of connections within

⁹ This Chapter is based on Robledo, Eggers, Echeverry, Duque (2018), "Do marketing networks really help start-ups? Simulating sales through Agent-Based Modeling and complex networks", working paper, Universidad Nacional de Colombia. Additionally, it was presented in the Global Research Symposium of Marketing and Entrepreneurship (GRSME) in Chicago, Illinois, USA, from August 12th to 14th (2015).

a network, Coleman (1990) showed that high-density networks promote sharing benefits, and Stam and Elfring (2008) proposed that density increases have a positive statistical significance, as related to growth in sales and business performance. However, Burt (1997, 2005) suggests that dispersed networks are the preferred option, since they promote access to diverse resources and information.

In addition, it has proven challenging to model the product marketing through networks. For example, one of the most prominent approaches is Bass' (1969) diffusion model. This model shows the diffusion of innovations through networks as a process of contagion, which starts by means of massive advertising, and then spreads by word of mouth (Bohlmann et al., 2010; Kiesling et al., 2012). However, this model does not take into account network heterogeneities or the micro level dynamics of social interactions, which create the word of mouth phenomenon (Kiesling et al., 2012). In addition, aggregate models explicitly demand the involvement of mass media for product diffusion (Bohlmann et al. 2010), a fact which goes against the characteristics and capabilities of entrepreneurship.

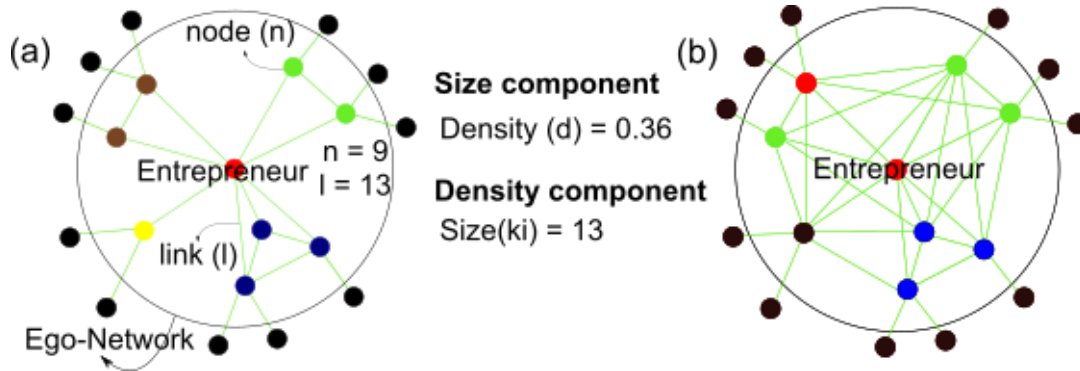
In order to break from these constraints and create new research perspectives, agent-based models (ABM) have increasingly adopted in Word of Mouth Marketing (WOMM) research (Nejad, Amini, & Sherrell, 2016). ABMs are capable of modeling consumer behavior and consumer decision making processes (Kiesling et al., 2012), as well as the related concept of the influence of social interactions among customers (Valente and Rogers, 1995). In addition, network heterogeneities can be modeled explicitly, with different network sizes and densities (Bohlmann et al., 2010). According to Bohlmann et al. (2010, p.744), "[t]here is clearly a lack of research on the overall structure of large social networks characterized by structural heterogeneities and their relationships to aggregate adoption behaviors in new product diffusion processes. How the network is structured defines the manner in which interpersonal communications can occur, and as such different structures may lead to fundamentally different diffusion patterns. For example, individuals with many communication links to others in the network may be more likely to adopt given the greater number of word-of-mouth influences." The focus on interpersonal communication within networks (vs. the additional involvement of mass media) also caters to the characteristics of small businesses.

In addition to modeling marketing networks, it is challenging to monitor their underlying processes, or to follow the path of products and the respective communication processes within networks. The absence of information and data in the WOM process, and of the whole social network, emerges, in large part, from the difficulty of getting data over a long enough time period for diffusion to appear. As a result, some investigations have attempted, with formal methods of measurement, the conversations among people from the same community (Bohlmann et al., 2010). Qualitative research prevails in this matter, whilst longitudinal studies have been practically absent (Aarikka-Stenroos et al. 2014). In order to solve these research issues, agent-based models can be simulated. This allows for a comprehensive look at the way in which certain features of social networks impact the sales of small firms (Bohlmann et al. 2010).

3.2 Study I: The influence of network structure in the WOM process

In Social Network Analysis (SNA) those who are part of networks are represented as nodes (n), and relationships between them are shown as links (l) (Wasserman, 1994). In this study, nodes are small firm owners and their contacts. Links are the relationships between them, as it is shown in Figure 3-1. The entire network of a small firm owner is called an ego-network in SNA (Everett and Borgatti, 2005). In the present study, all small firm owner contacts are taken into account, in order to analyze the following components of structural dimension: size and density.

Figure 3-1: Network concepts applied in marketing networking for small firms. (a) Example of a small firm owner's social network (links and nodes) and NM small firm components. (b) Example of high-density node.



The size of a node (k_i) is the number of contacts in an ego-network, or the number of links connected to other nodes (Wasserman, 1994). All of a small firm owner's links to spread a product through his or her social network are included. For example, if a node is connected with 50 contacts, the size will be 50. Therefore, the size of node i can be denoted by k_i (Equation 3.1).

$$Size(k_i) = links\ of\ n_i \quad (3.1)$$

Density d_i is the proportion of links in the network (Equation 2). Therefore, it is the division between actual nodes and all possible nodes. Also, density represents the degree of connection in the ego-network. Figure 3-1b shows an example of a high-density ego-network.

$$Density(d_i) = \frac{2l}{n(n-1)} \quad (3.2)$$

Where l is the number of links in an ego-network and n is the numbers of nodes.

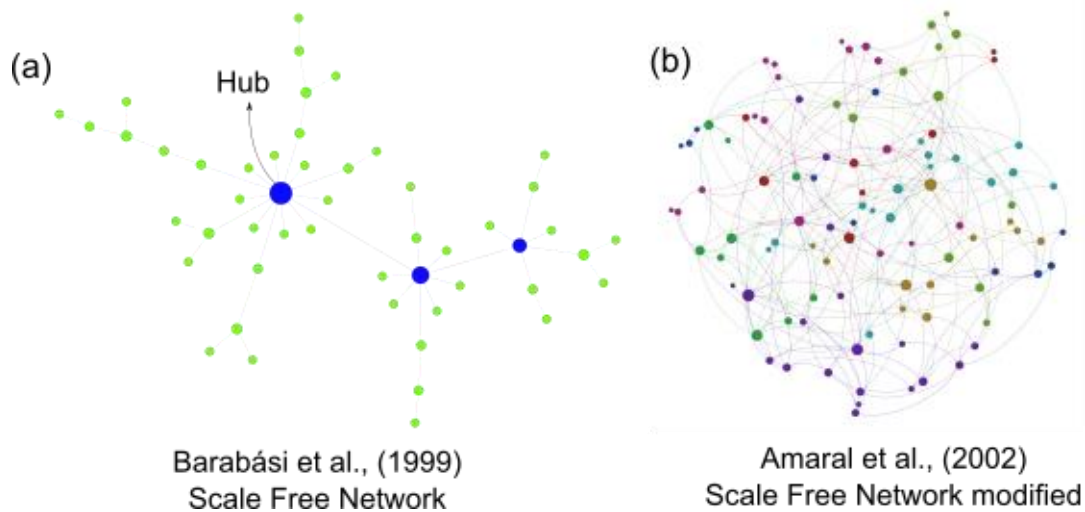
Given the constraints that come with empirically analyzing real networks, networks of small firm owners will be simulated. In order to ensure that the simulated network has similar characteristics to real social networks, not only SNA, but also inputs from research on complex networks will be used.

Complex networks are graphs (networks) with characteristics which often occur in real systems, such as the Internet (Gan et al., 2014), neurons (Uzuntarla et al., 2015), and social networks (Jiang et al., 2015). Scale-free networks represent an important category of complex network research (Barabasi et al., 1999). Within scale-free networks, some nodes have considerably more links (also called “hubs”) than the average node. In fact, in reality, many nodes have very few links. Figure 3-2a shows an example of a scale-free network. In this paper, an adjustment of the scale-free network, proposed by Barabasi et al. (1999), is used. Amaral et al.’s example is followed (2000). They showed that a hub has the restriction of indefinite growth (Equation 3.3), which is a realistic assumption in simulating social consumer networks, because there is a limit to the number of contacts that one can manage. Figure 3-2b shows a more realistic social network.

$$p = \frac{n}{2\pi D^2} e^{-Nd^2/2D^2} \quad (3.3)$$

In the equation above, p is the probability that a link can connect two nodes, D is the desired length-scale for generating networks, N is the number of agents, d is the average network density, and n is the average number of links in the network.

Figure 3-2: Scale free complex networks: (a) Barabási et al. (1999) and (b) Amaral et al. (2000) models



Given the components of structural dimension (size and density), and the type of network that will be generated (Amaral et al., 2000), the basics are in place for analysis of the variables in an owner ego-network, and to identify the influence of the network structure on product diffusion processes. In the next step, product diffusion through social networks and the consumer decision process are analyzed.

Diffusion of products through social networks

Diffusion of products through networks (DPN) is the process of the way in which markets are penetrated by new products, enabled by social influences (Peres et al., 2010). DPN is an important component of MN, as the resource constraints of small firms make it advisable to sell products via social networks (Miller et al., 2007).

ABMs can be used within simulations in which individuals or agents are described as autonomous entities that interact locally with each other and their environment (Grimm et al., 2010). Interacting locally means that agents interact only with their neighbors in a “space” such as their network. A typical ABM has three elements: a set of agents with their attributes and behaviors, a set of relationships and methods of interaction, and the agents’ environment, which enables interaction between agents (Macal and North, 2010). Applications of ABM span a wide range of areas and disciplines, from modeling adaptive immune systems (Folcik et al., 2007) to understanding consumer decision-making (Zhang and Zhang, 2007). In this study, ABM will be used to simulate the interaction between small firm owners and customers, so as to understand the influence of different network characteristics on product diffusion.

In order to predict product diffusion rates, Rogers (1962) and Bass (1969) assumed fully connected and homogeneous networks. However, real-world social networks are heterogeneous and composed of links and nodes with different properties (Barabasi et al., 1999). The dynamics and modeling of DPN in heterogeneous networks remains a challenge within the scientific community (Karsai et al., 2014). However, there are theories which allow for the addressing of heterogeneous networks as epidemic models (Barthélemy et al., 2005). Several diffusion models use the analogy between epidemic spreading and social contagion (Pastor-Satorras and Vespignani, 2002; Newman, 2002), like the Susceptible-Infectious-Recovered model (SIR). In the present study, “susceptibles” are

considered to be potential customers, those “infected” are current customers who promote the product, and the “recovered” are those who bought the product, but will not buy again. In this regard, the definitions of Kermack and McKendrick (1927) can be adapted to the marketing networking model (Table 3).

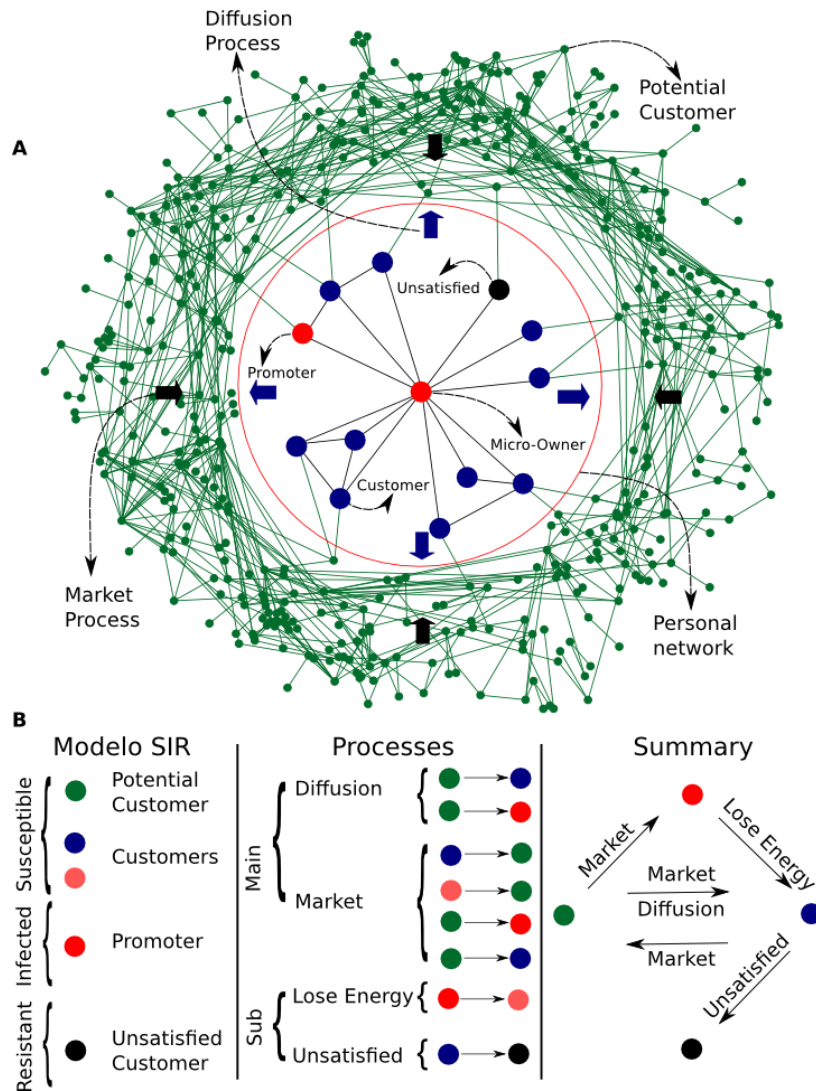
Tabla 3-1: Epidemic model versus Marketing Networking Model

	Epidemic model	Marketing networking model	Type of agent
S	People susceptible to the disease	Individuals susceptible to market or/and diffusion processes	Potential customers and customers
I	People who have been infected with the disease, and are able to spread it to those in the susceptible category	Individuals who bought the owner’s product and have high levels of satisfaction, thus promoting the product to potential customers	Promoters
R	This is the compartment used for people who have been infected and later got rid disease, whether due to immunization or death. Those in this category cannot be infected again, or transmit the infection to others	Customers who bought the product and had low satisfaction levels. They will not buy the product again	Dissatisfied customers

Processes are necessary in order to change the various states: positive diffusion, negative diffusion, loss of energy or dissatisfaction. Positive diffusion is the action of a promoter agent, who convinces their contacts to buy a product. This is typically the case when a customer with high satisfaction levels recommends a product to their contacts. Negative diffusion is the opposite of positive diffusion, in which a dissatisfied customer warns others about the product. Loss of energy refers to a decline in promoting capacity. If the customer has a very high level of satisfaction, their promoting capacity will be high, initially. However, over time, their promoting capacity decreases, as they will lose their energy for product promotion. When their energy level reaches zero, they stop promoting the product. Lastly, dissatisfaction will make unsatisfied customers resistant. They will not buy the product again.

The processes will change the different states of the agents. Potential customers may become customers, or even promoters. Current customers could become potential customers, as a result of dissatisfying product experiences. Promoters could become customers, owing to the energy loss process, and so on. An example of these processes is shown in Figure 3-3.

Figure 3-3: Artificial market. (a) Network of customers within the personal network of a small firm owner. (b) Susceptible-Infected-Resistant model applied to marketing networking for small firms.



Product diffusion is carried out in a social network, and is driven by an individual’s decision-making process (Janssen & Jager, 2001). Consumer Decision-Making (CDM) is the cognitive process of choosing a product from multiple alternatives (Stroles & Kendall, 1986).

Consumers take into account individual and social variables, in order to make buying decisions. The individual part expresses the similarity between product characteristics (c_j) and consumer preferences (p_i). For example, if product characteristics equal consumer preferences ($c_j = p_i$), there is a high probability that the buyer will select the product. However, this decision also depends on the social effect. Consumers are connected to others in a social network, which influences their need to show status and personality (Brewer & Kramer, 1986) and to belong to a group (Baumeister & Leary, 1995). Janssen's and Jager's (2003) cognitive process model is therefore selected to simulate the consumer decision-making process, as it considers both individual and social effects.

There are two main variables in Janssen's and Jager's (2003) cognitive process model: satisfaction and uncertainty. Satisfaction ($E[U_{ij}]$) reflects the level of customer contentedness i when using product j , and includes both individual and social aspects (Equation 3.4). The individual aspect refers to consumer preferences i (p_i) and product characteristics j (c_j). The social aspect refers to the fraction of contacts of i who use the product j (x_j). Both the individual and social aspects are weighted by β_i and $(1-\beta_i)$ respectively. Variable β_i expresses the sensitivity of a customer i in having a different product than their contacts. A high β_i means that personal need is weighted as less, which is the case for innovators, as discussed in the social diffusion process (Rogers, 1995).

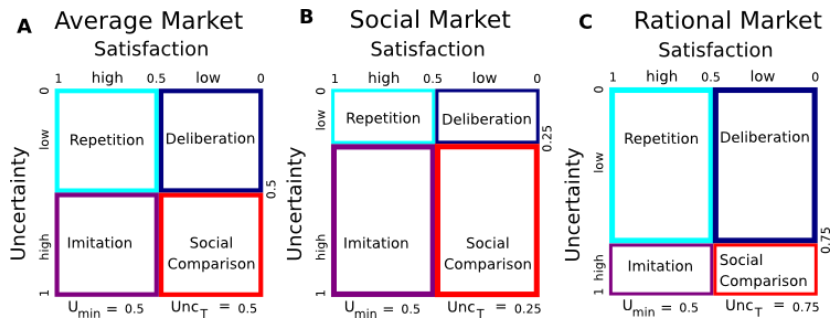
$$E[U_{ij}] = \beta_i * (1 - |p_j - c_j|) + (1 - \beta_i) * x_j \quad (3.4)$$

Uncertainty ($E[Unc_{ij}]$) (Equation 3.5) represents the customer's level of insecurity in making a decision. For example, if more contacts of consumer i are buying different products, uncertainty will be higher. Therefore, uncertainty represents the fraction of contacts that are buying a different product than customer i ($1-x_j$), weighted by the importance of social need ($1-\beta_i$). For example, if social needs are greater, uncertainty tends to be high if all the contacts are buying different products.

$$E[Unc_{ij}] = (1 - \beta_i) * (1 - x_j) \quad 3.5$$

In accordance with satisfaction and uncertainty levels, customers follow different cognitive processes: repetition, deliberation, imitation, and social comparison. These processes are shown in Figure 3-4.

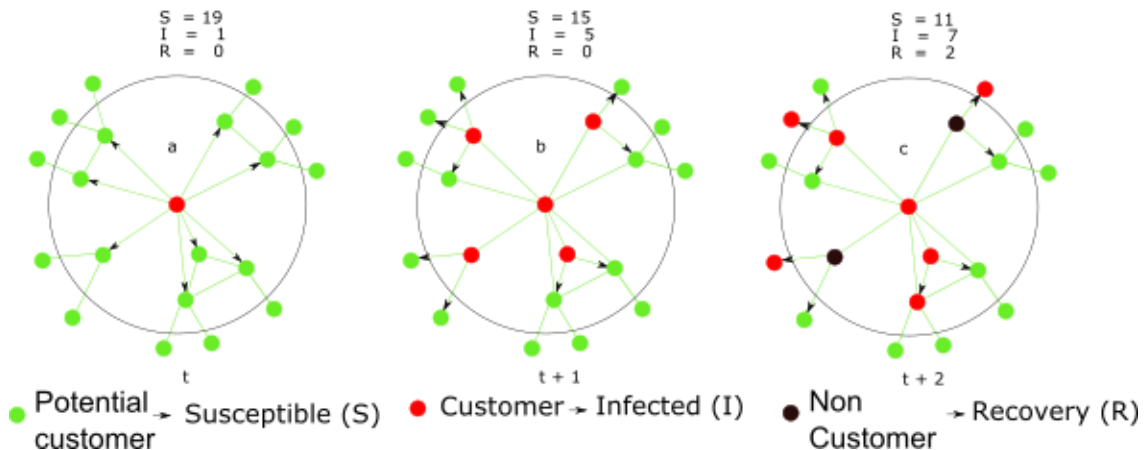
Figure 3-4: Types of markets: (a) average, (b) social and (c) rational with Janssen’s and Jager’s cognitive model.



Source: Janssen & Jager (2003)

Customers with low levels of uncertainty and high satisfaction *repeat* their last purchase. When customers have low satisfaction and low uncertainty, they have to *deliberate*, which means assessing the impact of all possible decisions, so as to maximize their level of satisfaction. Customers who have high uncertainty and high satisfaction levels are supposed to follow an imitation process, and copy the behavior of others. Customers with high uncertainty and low satisfaction levels will perform a *social comparison*. This implies comparison of their previous behavior with previous behaviors of other customers in the network, and choosing the behavior which shows the maximum level of satisfaction (Figure 14).

Figure 3-5: Network Marketing in small firm diffusion process



3.2.1 The artificial market

To start the simulation, an artificial market is created, with 500 potential customers (N) and 10 different products, in which one of these is the owner's product. All 10 products are spread throughout the market. The small firm owner in question begins to sell their product among their closest contacts. It is assumed that potential customers have an average of 20 friends. The preference for a product p and its features B have a uniform distribution between zero and one. The network features are determined by the Amaral et al. (2000) algorithm, in which D is two, and the average node degree is 20. Also, in order to analyze diffusion processes, one must assume that each product creates different levels of satisfaction for its buyers. Therefore, in the simulated market, it is assumed that 5% of customers will have a high level of satisfaction with the owner's product, another 5% will have a low satisfaction level, and 90% will have an average satisfaction level with the product. In this regard, the consumer decision-making process as proposed by Janssen and Jager (2003) is used. To create a more realistic scenario with potential customers, actual customers, promoters, and unsatisfied customers, the main principles of epidemic models are applied to this investigation's model with players that are susceptible, infected, or resistant (Kermack and McKendrick, 1927). The processes of positive diffusion, negative diffusion, energy loss, and dissatisfaction are used, in order to change the various customer states.

The impact of different network configurations is tested on sales in three types of markets: average, social, and rational. These markets were designed by changing the thresholds in Janssen's and Jager's (2003) model. In average markets, the minimum utility (U_{\min}) and the maximum uncertainty (U_{\max}) are both 0.5. This means that all agents have the same probability of making rational or social decisions. In social markets, the value of maximum uncertainty was changed to 0.25. Therefore, there is a high probability that 75% of agents will make a decision influenced by their social networks. Product examples in social markets include music, clothes, cell phones, and personal computers. Customers in social markets can see their contacts' products, which influence their decision-making process.

Finally, in order to create a rational market, 0.75 is assigned for maximum uncertainty. Thus, 75% of agents will make a rational decision when buying products. In rational markets, the decision-making process is more individual, and customers are less influenced

by their social networks. Examples of products in this market include milk, shampoo, deodorant, or toothbrushes.

These settings for the artificial market were then used to run two experiments, as detailed below.

3.2.2 Experiment I: The impact of structural ego-network properties on total market sales

In this experiment, the size and density of ego-networks are analyzed, as is their effect on total market sales. Total market sales are the sum of daily sales at the end of the simulation. Figure 3-6 shows an example of this process. Sales are initiated by the small firm owner in their ego-network. At one point, sales will spread beyond the confines of the ego-network. This is when the small firm owner can no longer intervene in the sales process. Size and density are contrasted with market sales, in order to find a correlation between the two.

Figure 3-6: Example of Total Market Sales (TMS)



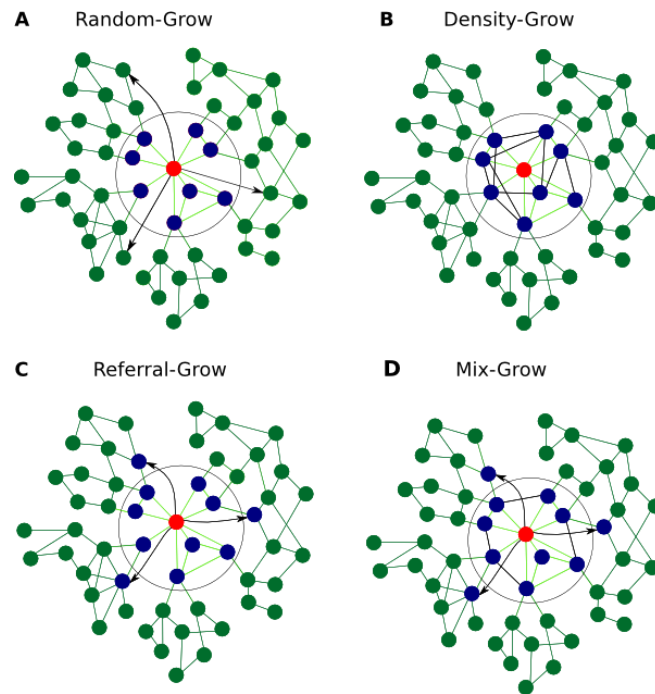
3.2.3 Experiment II: Identification the best strategy in the diffusion process

In the second experiment, four different marketing networking strategies are created and applied in the three markets. All the strategies are shown in Figure 16. The first strategy is called random-grow, in which the owner introduces the product, randomly, to potential customers (Figure 16a). The second strategy, density-grow, is about the owner increasing the density of their ego-network, by making connections between their contacts (Figure 16b). In the third strategy, referral-grow, the owner tries to increase sales by stimulating

referrals among their contacts (Figure 16c). The fourth strategy is a mixture between density-grow and referral-grow strategies, where the owner asks for referrals, and creates links between their contacts (Figure 16d).

Figure 3-7: Strategies for marketing networking in small firms.

(a) Random-grow: the small firm owner tries to sell their product to strangers. (b) Density-grow: the small firm owner increases the density of their personal network, so as to activate the diffusion process. (c) Referral-grow: the small firm owner asks for referrals inside their personal network. (d) Mix-grow: a combination between density and referral-grow strategies.



3.2.4 Results

Experiment I

The results of Experiment I revealed that network size and density had a positive impact on sales in the social market. Network size positively influenced sales in the average market, whereas structural network characteristics had no impact in the rational market (Table 3-1).

Table 3-1: Influence of structural network characteristics on total market sales.

	Mean	R-square	
Types of market	Total market sales	Size	Density
Average	2946.41	0.0884*	0.015
Social	9502.9	0.2237**	0.1343**
Rational	370.91	0.001	0.0004
** p<0.001, *p<0.01			

Therefore, in the social market, both components of the ego-network structure influenced total market sales. This may be because more customers are found to make decisions influenced by imitation and social comparison. Both processes should be impacted by denser and larger networks. In the other two markets, density and size had little influence on total market sales. Here, the decision-making process was mainly based on repetition and deliberation, both features of rational markets.

Experiment II

In order to ascertain the impact of the four different strategies (random-grow, density-grow, referral-grow and mix-grow) in each market, 100 simulations were run for each strategy and market. In the next step, all strategies were compared, for each market, through Kruskal-Wallis testing for nonparametric data. Table 5 shows significant differences between the different strategies.

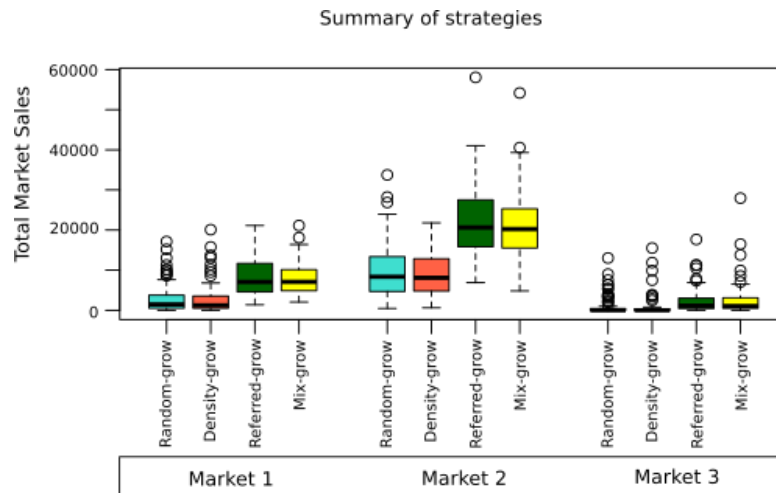
Table 3-2: Non-parametric analysis of variance (Kruskal-Wallis)

		Random-grow		Density-grow		Referral-grow		Mix-grow		Kruskal-Wallis	
Market	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Chi-squared	p-value
Average	100	2779.14	3405.81	2665.79	3569.56	8197.83	4526.25	7883.87	3971.71	174.781	<0.001
Social	100	9731.87	6512.40	9307.89	5566.33	21920.63	8279.78	21031.22	8180.21	184.643	<0.001
Rational	100	928.36	2150.23	716.86	2348.47	2354.48	2940.75	2468.15	3791.87	138.804	<0.001

Tamhane's *post hoc* test was performed, in order to run multiple comparisons (Table 6). There were no significant differences between random and density-grow, and no significant

differences between referral and mix-grow found in any of the markets. However, there were significant differences between random/density-grow and referral/mix-grow, as shown in Figure 3-8. Growth through referrals is typically regarded as a success factor (Schimtt et al., 2010), and mix-grow combines the effects of two strategies (referral and density-grow).

Figure 3-8: Total market sales in all markets and for all strategies.



Referral-grow and mix-grow showed the best performance in all markets. In addition, these strategies provided better results in markets with high social influence in the consumer decision-making process, as shown in Market 3. Also, these strategies are not significantly different from each other. However, from a practical point of view, referral-grow seems to be a better strategy, as it is easier to implement. Here, the small firm owner does not need to create links between their contacts, which would be an energy and time-consuming task. Table 3-3 shows the multiple comparisons with Tamhane’s post hoc test.

Table 3-3: Multiple comparisons (Tamhane’s post hoc test)

		Market 1		Market 2		Market 3	
(i) Strategy	(j) Strategy	Mean df(i-j)	p-Value	Mean df(i-j)	p-Value	Mean df(i-j)	p-Value
Random - grow	Density	113.35	1	423.98	0.997	211.5	0.986
	Referral	-5418.69	<0.001	-12188.76	<0.001	-1426.12	0.001
	Mix	-5104.73	<0.001	-11299.35	<0.001	-1539.79	0.003
Density - grow	Random	-113.35	1	-423.98	0.997	-211.5	0.986

	Referral	-5532.04	<0.001	-12612.74	<0.001	-1637.62	<0.001
	Mix	-5218.08	<0.001	-11723.33	<0.001	-1751.29	0.001
Referral - grow	Random	5418.69	<0.001	12188.76	<0.001	1426.12	0.001
	Density	5532.04	<0.001	12612.74	<0.001	1637.62	<0.001
	Mix	313.96	0.996	889.41	0.971	-113.67	1
Mix - grow	Random	5104.73	<0.001	11299.35	<0.001	1539.79	0.03
	Density	5218.08	<0.001	11723.33	<0.001	1751.29	<0.001
	Referral	-313.96	0.996	-889.41	0.971	113.67	1

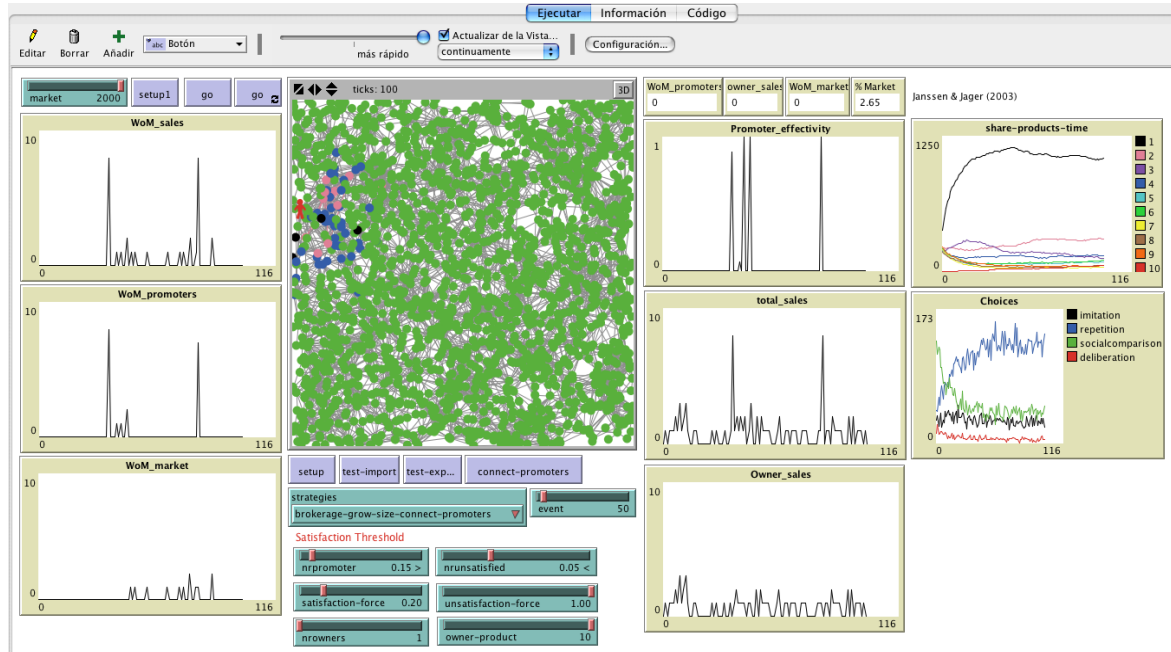
3.3 Study II: Influence of promoters in the WOM process¹⁰

This study analyzes the influence of promoters (WOM actors) in the diffusion process, by way of simulations. The same model generated in section 3.1 was used, with social market and referral strategies. The methodology and results are explained below.

3.3.1 The artificial market

As in the first experiment, NetLogo Software (Wilensky, 2009) was used to simulate the artificial market. Figure 3-9 shows a screen of the model.

¹⁰ This part of the thesis was presented in the “IEEE 11 Congreso Colombiano de Computación”, Popayán – Cauca, 2016 and it is part of the Echeverry (2016) thesis.

Figure 3-9: Environment of the simulated market in NetLogo Software

In this experiment, results from Experiment I were used. This means that the second simulated model had a social market feature, and the best networking strategy (referrals) development by the entrepreneur. Similarly, potential clients are increased to 2,000 because network marketing strategies increased the effectivity of sales. All other parameters remained the same.

3.3.2 Experiment I: Importance of promoters

The objective of this experiment was to identify the influence of promoters in the WOM process, in an entrepreneurial context. In order to do this, agent satisfaction parameters were changed. For example, the first study used a model with 5% potential of highly satisfied customers, and 20% potential of highly unsatisfied customers. In this experiment, the high satisfaction parameter was changed to 5, 10, 15, 20, 30, 40, and 50 percent. As such, the promoters rating can be controlled in each experiment, so as to understand their influence in the WOM processes.

A client with a high satisfaction level tends to share information about the product easily. In the model, promoters (highly satisfied customers) influenced their acquaintances to buy the product. The probability of success or failure depended on their level of satisfaction with

the product (customer preferences versus product characteristics) compared to a random number. Furthermore, in each tick of the simulation, the energy of this satisfaction decreased because the customer would not promote the product their entire life. The amount of energy depended on their level of satisfaction. If satisfaction was very high, promotion time was longer.

3.3.3 Experiment II: Strategies

In order to take advantage of promoters in increasing entrepreneurs' sales, two network marketing strategies were designed with promoters: incentives and events. The use of incentives in marketing is well-known, and has shown to be a good strategy (Peluso et al. 2017). This study does not specify which incentives are to be given to promote the product. Incentives could include money, rewards, additional products, or training. Events have been shown to have a positive impact on brand equity (Zarantonello and Schmitt 2013) and help as a leverage tool for client engagement (Close et al. 2006). Examples of events might be street events, trade shows, or sponsored events (Zarantonello and Schmitt 2013).

In this experiment, the incentives were energy given to the promoters when they made a successful recommendation. This energy allowed them to continue in their attempt to influence others in the buyer decision-making process. In order to generate a scene with events, promoters were connected to each other in the middle of the simulation time. This is similar to what happens in a real event. Customers meet others, thus changing the network structure.

Finally, in order to test the strategies, they were compared to referrals, and a mixed strategy was then created. The referrals strategy was the best one in Study I and mix strategy is a mixture of the two strategies: incentives and events. The results of the experiments are shown below.

3.3.4 Results

Experiment I

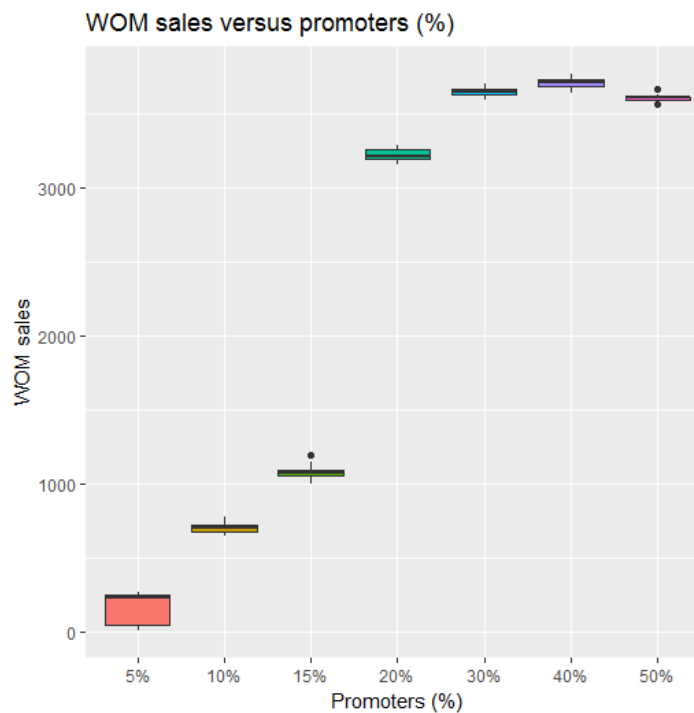
Table 3-4 shows the results of Experiment I, with an increase in promoter proportion, market sales are higher. However, after 15% of promoters in the market, results present unreal

values, because the product will take off at disproportionate rates, as it is shown in Figure 3-10.

Table 3-4: Descriptive statistics of WOM sales vs promoters

% Promoters	WOM sales (median)
5%	230
10%	703
15%	1076
20%	3214
30%	3648
40%	3719.5
50%	3612.5

Figure 3-10: WOM sales versus promoters (%)



In order to confirm whether WOM sales in each promoter proportion were different, several statistical tests were applied. In order to achieve this, it was necessary to assess the

normality of the data, through application of the Shapiro-Wilk test, with a confidence interval of 95%. Table 3-5 shows that only one result (5% promoters) has a normal distribution.

Table 3-5: Normality test data in Experiment I

% Promoters	Statistical value of the test (W)	p-value
5%	0.7907	0.01119
10%	0.9727	0.915
15%	0.9529	0.7027

Table 3-6 shows the nonparametric techniques applied, such as the Kruskal-Wallis test, with a significance of 0.05 (Table 8), in order to assess the differences among groups. The data reflects a Chi-square of 36.59 with three degrees of freedom and a p-value of 5.6e-08. Therefore, there are significant differences between simulations of each promoter percentage.

Table 3-6: Kruskal-Wallis test in Experiment I.

Chi-squared	Degrees of freedom	p-value
36.5888	3	5.622e-08

Thereafter, a *post hoc* test was applied, in order to compare multiple groups, and to determine which of them presented differences. According to Table 3-7, the post hoc test shows a statistical difference between 5% and 15% of promoters, with a significance level of 0.05. Therefore, the optimum minimum of promoters is 15% of the client total, in order to create a WOM process, and counter the negative WOM.

Table 3-7: Kruskal-Wallis Post hoc test. WOM sales vs promoters

% Promoters	Observed difference	Critical difference	Difference
5% - 10%	10	13.79315	FALSE
5% - 15%	20	13.79315	TRUE

10% - 15%	10	13.79315	FALSE
-----------	----	----------	-------

Experiment II

The purpose of this experiment was to identify whether incentives and event strategies are good network marketing strategies. The results of the simulations reflect that the strategy with incentives and an event at the same time presents better outcomes as it is shown in Figure 3-11 and in Table 3-8. However, it is necessary to test whether the results were significantly different from them.

Figure 3-11: Performance of network marketing strategies

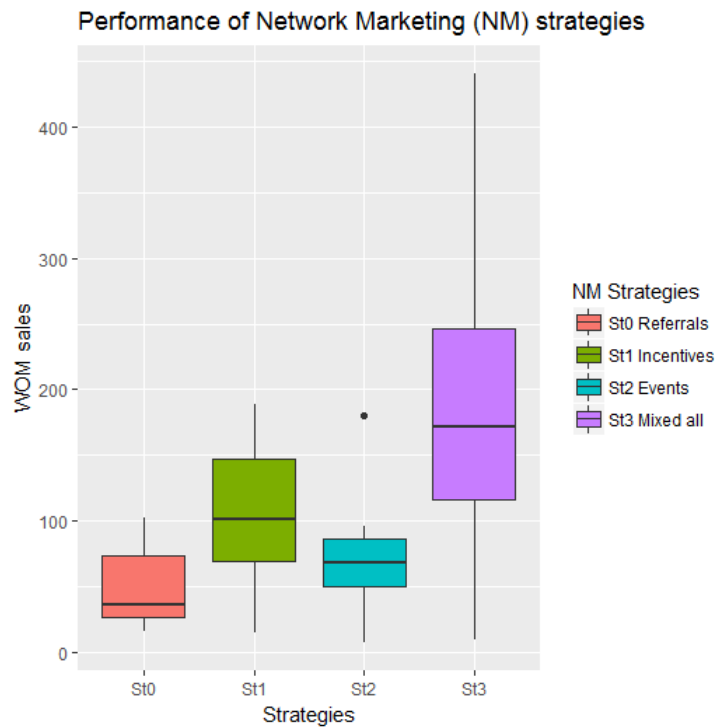


Table 3-8: Descriptive statistics. WOM sales for each strategy.

Strategy	WOM sales (mean)	WOM sales (standard deviation)
Referral	47.7	31.8
Incentives	106.7	56.3

Events	72.4	45.8
Incentives + Events	192.5	123.3

In order to identify these, the Shapiro-Wilk test was applied, in order to determine the normality of the data. According to Table 3-9, the results of each strategy do not have normal distributions. Therefore, it was necessary to apply the Levene test for homogeneity of variances and variance analysis (ANOVA), so as to compare the four strategies.

Table 3-9: Normality test. WOM sales for each strategy.

Strategy	Statistical value of the test (W)	p-value
Referral	0.8453	0.05108
Incentives	0.9745	0.9288
Events	0.8954	0.1949
Incentives + Events	0.9651	0.8418

Table 3-10 shows a significance of 0.732 of the Levene test, thus, homogeneity of variance is accepted.

Table 3-10: Levene test. WOM sales for each strategy

Statistical value of test (F)	Degree of freedom	Significance asintotic
0,121	18	0.732

Additionally, the ANOVA test (Table 3-12) presented an F value of 7.44 with three degrees of freedom and a p-value of less than 0.001. Therefore, there is a significant difference between the strategies.

Table 3-11: ANOVA. WOM sales for each strategy

Statistical value of test (F)	Degree of freedom	p-value
7.44	3	0.000531

In order to identify the best strategy, a post hoc test was applied (Table 3-13). The results showed a significance level of 0.05 between strategies. Hence, a mix of incentives and events generate more WOM sales for entrepreneurs.

Table 3-12: Tukey Post-hoc test. WOM sales for each strategy

Strategy	Difference	p-value
St0 - St1	59.0	0.2902777
St0 - St2	24.7	0.8746604
St0 - St3	144.8	0.0004918
St1 - St2	-34.3	0.7237895
St1 - St3	85.8	0.0594800
St2 - St3	120.1	0.0042399

4. How are Word of Mouth Sales Activated? Networking Strategies for Entrepreneurial Marketing¹¹

4.1 Introduction

Everyday Word of Mouth (WOM) has become increasingly important in Entrepreneurial Marketing (EM). Also, networking appears to be the link between EM and the entrepreneur's active role. However, appropriate networking strategies that activate WOM sales are still unknown. Therefore, the purpose of this preliminary study is to identify the best networking strategies which activate the WOM sales in startups. For this, the authors analyzed a technological product's networking campaign for 104 days. The results show that referrals and promoters are key elements in the WOM process. In light of these results, the authors suggest that entrepreneurs use these networking strategies to better activate WOM sales in an EM context.

For decades, marketing researchers have tried to understand the activators of WOM sales (Chevalier & Mayzlin, 2003; Godes et al., 2004; Risselada et al., 2015). In addition to considering the main actors of this process as influencers or imitators (Godes, David, & Dina, 2004b), this effort has been focused, largely, from a big firm perspective (Y. Liu & Yong, 2006; Trusov et al., 2009). Overall, this investigation has been somewhat limited, in terms of scholars' ability to explain WOM sales in regards to entrepreneurship (Chollet et al., 2014). In response, researchers have acknowledged the idea that WOM sales in

¹¹ This Chapter is based on Robledo, Eggers, Risselada, Duque (2018), "The impact of location and/or social influence on online referral behavior", working paper, Universidad Nacional de Colombia. Additionally, it was presented in the Global Research Symposium of Marketing and Entrepreneurship (GRSME) in San Diego, California, USA, from August 1st to 3rd (2016).

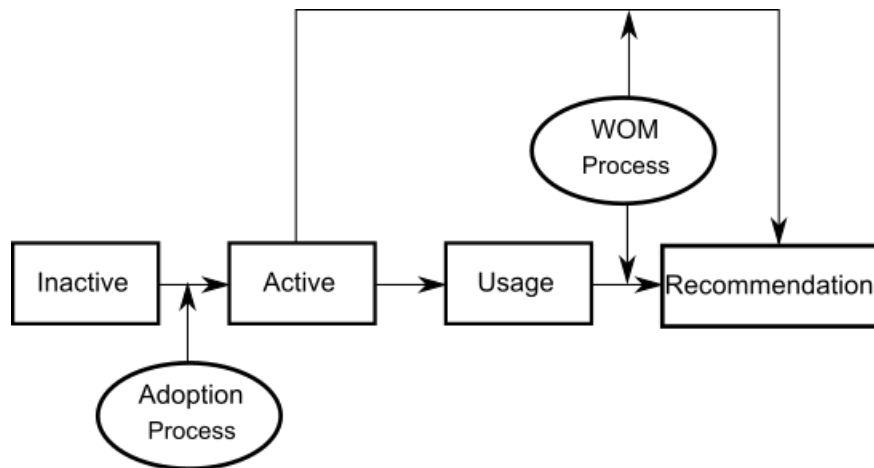
Entrepreneurial Marketing may also be largely determined by networking strategies (Stokes & Lomax, 2002).

Previous literature suggests three ways to activate WOM processes: influencers, network structure, and critical mass (Robledo et al., 2013). However, these three perspectives have raised contradictions between them. The first research focus in the diffusion process was on influencers, opinion leaders, and well-connected people (Van den Bulte & Joshi, 2007). Watts and Dodds (2007) showed that diffusion explosions are activated by a low proportion of easily influenced people. In contrast, Bohlmann et al. (2010) proved the influence of network structure in the diffusion process (the way in which people in the market are linked), and so, different network topologies will have a different diffusion processes. Thus, even if the best strategies for activation of WOM processes are known, the problem (in practical terms) is how to identify influencers, critical mass, and market network structure (Haenlein, Michael, & Barak, 2013). The question is the same for entrepreneurs: Which are the best strategies for activation of WOM sales? In Chapter 3, two network marketing strategies were proposed in the EM context: referrals and promoters, using simulations.

One of the objectives of this study is to contrast the results of network marketing strategies with real data. Specifically, three network marketing strategies are empirically assessed: random-grow, referral-grow, and promoter-grow. Random-grow refers to showing the product to random people. Referral-grow mean of asking acquaintances for referrals. Finally, promoter-grow means the influence of highly satisfied customers on WOM sales.

These questions are investigated through study of a technological product's diffusion process: Tree of Science (ToS)¹². ToS is an online tool for scientific research articles, and the only way to access ToS is with the invitation of an acquaintance. Thus, it was possible to map the diffusion process, and identify the best marketing strategies. Hence, it was possible to investigate the presence of WOM sales, in accordance with each strategy, the setting of greatest relevance to both entrepreneurs and researchers (Iyengar et al., 2011), Figure 4-1 shows the general macro processes: adoption and WOM.

¹² Software register 13-62-226 by Universidad Nacional de Colombia

Figure 4-1: Tree of Science word of mouth process

These insights are particularly relevant for entrepreneurs aiming to exploit WOM sales. Preliminary results show that random-growth has no influence on WOM sales. Therefore, entrepreneurs should select connected customers in order to increase WOM sales. Also, referral-growth has a positive influence on WOM sales. Entrepreneurs should ask for referrals on their daily selling activity, in order to leverage sales. Finally, it was found that promoters have a positive relationship with WOM sales. Therefore, entrepreneurs should identify users with high satisfaction levels, in order to create networking strategies with them, such as events or incentives. Identification of the best networking strategies in an entrepreneurial context is important because entrepreneurs should monitor their marketing time, so as to not waste hours on poor marketing strategies.

The remainder of this Chapter is structured as follows. The data collection process of a technological product is first presented, tracking the referral activity. The duration of the marketing campaign was 367 days, and at the end, the sample contained 4,816 users. Next, an exploratory and inferential analysis of the data is presented.

4.2 Method

4.2.1 Data overview

In this study, WOM sales in the technological industry are empirically investigated. In order to test the hypothesis, a technological product, called Tree of Science (ToS), was created and launched on the market (the algorithmic code can be found in Appendix 2). Data were

collected from the ToS¹³ diffusion process of. ToS is a free web-based tool, which uses sophisticated network algorithms to optimize the search and selection of published articles. ToS clients are researchers who wish to find relevant papers for their frameworks. The diffusion process is similar to an entrepreneurial context, as it has very little money to invest in big marketing campaigns, a turbulent environment, and an innovative product. Data were collected from a marketing campaign that ran from September 3, 2015 to September 3, 2016 (367 campaign days). Two co-creators of the web-page (one of whom is the author of this thesis) began to promote the use of ToS, using different approaches. Additionally, there was another individual in charge of social media marketing. These three people were the initiators, or seeds, who started the WOM processes. Thus, they were removed from the data analysis.

In order to map the diffusion process, the only way to access ToS was by way of acquaintance invitation. The process began with the co-founder, and little by little, it increased the use of ToS in the research community. The referral process has three steps: invitation, registration, and activation. The invitation is when an acquaintance sends an email from ToS, in order to invite someone else. Next, the person who was invited should register, following a link in their email.

Finally, this person will receive a new email, verifying that they are the owner of the registered email. Thereafter, they can access ToS. Owing to this procedure, a network of the diffusion process is created.

There are several benefits to working with a single firm for this project. Firstly, individual nodes can have a significant impact on overall network measures. Secondly, working with a single company makes it easier to gather data, and clean data is critical for an accurate representation of the diffusion network. Thirdly, focusing the study on one company enables control of a variety of external factors, such as market turbulence, substitute products, political rules, and so on, which can complicate results in multi-firm studies. Therefore, this study's data represents a relatively complete network for the diffusion process of a technological product, from an entrepreneurial perspective. Furthermore, relationships

¹³ All data were made anonymous, due to privacy concerns and legal restrictions, before they were made available to investigators.

between nodes can be identified because all invitations are saved, even if a user has already been invited. Although an author of this investigation was also the entrepreneur, WOM sales had a natural diffusion process.

4.2.2 Data processing

Data was downloaded directly from the ToS website in three files: user, invitation, and usage. The user file contained 2,327 registers with ID and invitation date variables. The invitation file had 1,129 rows, with inviter, invitee, and date of invitation information variables. The last file, usage, had 4,728 registers with the name of the Web of Science files uploaded by each user.

The first step was to convert all invitation data in lowercase letters, in order to identify duplicate user IDs. Second, a database was created with the three files. Third, duplicates on invitation file were checked. This was necessary because a user could send several invitations to the same person. Therefore, the network is directed and with link values of one. Fourth, loops in the data were deleted. This is because some users sent invitations to themselves. Fifth, a user table was created with user and invitations table information, so as to have all active and inactive users in a single table. Finally, a graph object was created with the 2,139 active and inactive users, and another with 2,324 invitations. Measurements *Activation*. Time from tool launch date with activation process. This is to control for baseline effects.

Gender. Gender was measured with `genderizeR` in R. This package uses an API (`genderizer.io`) to forecast the gender of users from their names. It works with two parameters: the probability of gender with the first name, and the counts of first names. Additionally, females were coded with one, and males with zero.

Activation Delay. This is the difference between invitations and activation dates. Invitation dates were generated when a user received the invitation for the first time. Thus, if the user received several invitations, the invitation with the smallest date was selected. Additionally, the activation delay is measured in days.

Usage. This was calculated as the sum of Web of Science file uploads to ToS. These files are the searchers of each user and are plain files (txt format).

Coreness. In order to understand the influence of network structure in the WOM process, the network metric “coreness” (see Wasserman & Faust, 1994, for the formula) was selected to elaborate a statistical model. The coreness network metric shows how far or near the node was to the core of the network. For example, in this study, it will show us whether a node with close acquaintances in the WOM network will influence, whether they will send an invitation or not.

Invitations sent. This was measured as the sum of all invitations sent by each user. This is our WOM variable.

4.2.3 Results

The direct effect of network structure on the WOM process

The descriptive statistics in Table 4-1 show that: the average number of invitations sent by a user was about four, each user had a delay in ToS account activation of, on average, 7 days, and the proportion of women and men who registered was similar (46% women). Additionally, the first hypothesis was tested using multilinear regression models (Table 4-1), and the second, using K-means clustering analysis.

Results are compatible with the hypothesis posed previously: users who are closer to the kernel of the network (high coreness) compared to the most remote users, tend to invite more people, and thus, exhibit more WOM influence ($r = 0.32$, $p < 0.01$). Hypothesis 1 suggested that there was a positive effect of network structure on WOM process, in an entrepreneurial marketing context. The results support this prediction, with the regression analysis summarized in Model 4, in Table 4-2. The overall model, including self-monitoring, was significant, $F(5, 730) = 42.51$, $p < .001$, and explained 22% of the variance. Controlling for the significant effects of usage, network structure (coreness) predicted the extent of the WOM process (invitations sent) ($B = .24$, $p = .001$), accounting for an additional 4% variance, beyond that explained by the control variables.

Table 4-1: Correlation matrix

Means, standard deviations, and correlations

Variable	M	SD	1	2	3	4	5
1. activation	132.28	112.14					
2. gender	1.54	0.50	.03				
3. Activation_delay	7.01	30.30	.15**	.06			
4. usage	2.95	3.92	-.21**	-.02	-.06		
5. coreness	1.49	0.56	-.28**	-.06	.08*	.18**	
6. invitations_sent	4.65	9.45	-.19**	-.02	.01	.40**	.32**

Note. N = 736

* indicates $p < .05$; ** indicates $p < .01$.

M and SD are used to represent mean and standard deviation, respectively.

Table 4-2: Summary of regression analysis predicting invitations sent.

Variable	Model 1	Model 2	Model 3	Model 4
Activation since launch	-0.20**	-0.12**	-0.11***	-0.06**
Gender	0.02	0.01	0.00	0.00
Activation_delay	0.04	0.06	0.01	0.03
Usage		0.38***		0.35***
Coreness			0.28***	0.32**
R^2 /adj. R^2	.39 / .035	.177 / .035	.112 / .172	.226 / .220
F	9.77***	39.18***	22.95***	42.51***
SE	9.29	8.60	8.93	8.35
dfs	3,732	4,731	4,731	5,730

Note. N = 736. Values represent standardized coefficients

* $p < .05$ ** $p < .01$ *** $p < .001$

The direct effect of WOM actors on the WOM process

A principal component was created for identification of WOM actors in the Tree of Science WOM process. Figure 4-2 shows three WOM actors, and for each of them, the amount is smaller than the others. These were labeled “influencers”, “strong-promoters”, and “low-promoters”. According to the data, influencers included librarians and staff from university libraries. They were important in the diffusion process because they represent only the 0.2% of the total users who sent at least one invitation, but sent 16.4% of total invitations.

On the other hand, strong promoters were also a small proportion (1.5%) but represented approximately 33% of all invitations. Finally, there was a large WOM actors group that promoted ToS to very few people; these were called low-promoters. This group constitutes 22.5% of all promoters, and they sent almost the half of the total invitations (50.6%). These results are important because entrepreneurs could focus on influencers and strong-promoters (e.g. 1.7% in this case), who will influence the WOM process heavily (e.g. 49.3% in this case).

Figure 4-2: K-means clustering analysis

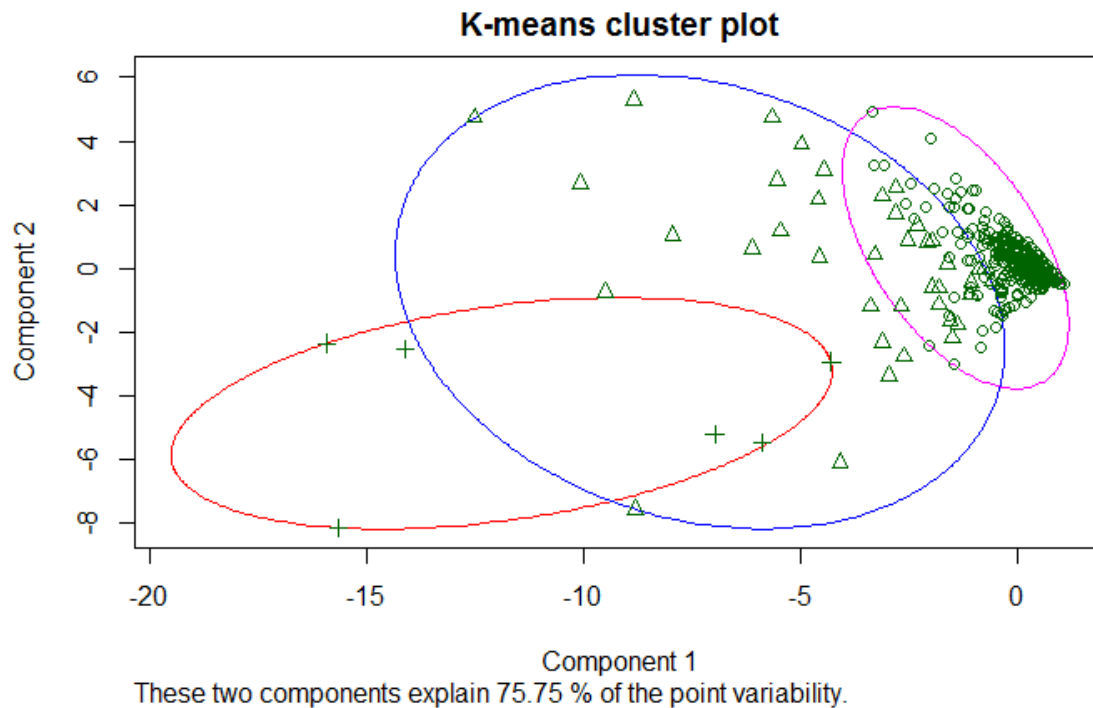


Table 4-3: Impact of each WOM actor in WOM activations

WOM actor	Number of WOM actors	% Invitations
Influencers	0.2% (8)	16.4% (561)
Strong promoters	1.5% (47)	32.9% (1128)
Low promoters	22.5% (681)	50.6% (1731)

Non promoters	75.6% (2290)	0
Non active users	1787	0

5. The Network Marketing Model¹⁴

5.1 Introduction

This thesis proposes a network marketing model as an entrepreneurial marketing tool. Networking is accepted as a marketing strategy for entrepreneurs and small firm owner-managers. Also, word of mouth plays an important role because entrepreneurs rely heavily on customer recommendations for the acquisition of new clients and preservation of old ones. In order to increase the effectiveness of these two strategies, an entrepreneurial marketing context is necessary, meaning a context with a market and entrepreneurship orientation. Although there has been considerable attention paid toward these concepts, previous research has failed to build a theoretical framework linking these topics (Stokes and Lomax, 2002). Therefore, we propose a conceptual model of network marketing in order to fill this gap. To that end, in Chapter 3, the networking literature was reviewed, highlighting the importance of networking in an entrepreneurial marketing context, as well as the main elements of WOMM. Additionally, in Chapter 4, we simulated an artificial market, so as to understand the influence of network structure and WOM actors in the EM context. Finally, in Chapter 5, results from the simulations are contrasted with real data from an entrepreneurial product: Tree of Science. In this vein, this Chapter achieves the last objective of the thesis proposing a marketing model for entrepreneurs.

The third objective was met with the results of the simulations, ToS data, and the experience of ToS promotion. In this part, the network marketing concept is defined as an *“Entrepreneurial Marketing tool based on networking where entrepreneurs and small businesses initially rely in his/her social contacts in order to generate a consumer's network*

¹⁴ This models was presented at the Global Research Symposium on Marketing and Entrepreneurship (GRSME) in San Diego, California, USA, between from August 1st and to 3rd.

and, in this way, they can transform the structure of his/her social network to increase sales through the influence of word of mouth processes". Also, three dimensions are proposed for this model: structural, relational, and human. The structural dimension refers to the measurements of links and nodes in the network, and their influence on the WOM process. The relational dimension is defined by the link content, for example, how to generate trust, commitment and co-operation. The human dimension refers to the abilities of a person to connect with others, for example: through leadership and communication skills.

The remainder of this Chapter is organized as follows: in the first part, the NM model concept is explained. Next, the three dimensions of the model are explained: structural, relational and human. Thereafter, three network marketing actors are proposed: influencers, opinion leaders, and revenue leaders. Finally, three network marketing strategies are described: referrals, incentives, and events.

5.2 The Network Marketing Model

It is well known that networking is an essential marketing tool for entrepreneurs and small firm owners (Slotte-Kock & Coviello, 2010). Most of the time, they are in a context with a lack of resources such as time, money, and knowledge (Dragnic, 2009). Therefore, they should initialize sales with their own personal network, and later try to activate the word of mouth process. This is an important topic because sales in entrepreneurship should not depend on the capacity of the owner, as this increases the probability of failure. Therefore, it is important to analyze elements which could activate the diffusion process in the market, and attempt to propose a conceptual model for entrepreneurs and small firm owners, so as to facilitate and improve sales. Hence, one of the most important EM tools will be focused upon: networking (Gilmore et al., 2001).

The NM concept has received several names: marketing by networking (Gilmore and Carson, 1999; Gilmore et al., 2001) and marketing networking (Carson et al., 2004), among others. Also, it has been investigated from different perspectives, for example, Jones et al. (2013) proposed a Strategic Network Marketing Model (SNMM) in which the parties involved were sellers, buyers, or other firms, but not individuals. Carson et al., (2004) and Rocks et al. (2005) studied NM from a social network perspective: family, friends, or acquaintances. In this study the latter approach will be expanded upon. It is important to differentiate NM from other marketing types. For example, network-based marketing (Hill,

2006) and multilevel marketing (Hatchaleelaha and Wongsurawat, 2016) are different from NM because their main feature is the big firm perspective, while NM focuses on the entrepreneurial perspective, for example, owner's personal contact networks play a central role in NM (Diane, 2009; Hill, 2001).

Despite a variety of studies regarding NM, there is considerable room for further research in linking networks to performance (Slotte-Kock and Coviello, 2010), as well as development of a framework that identifies the best NM strategies (O'Donnell, 2014). Carson et al. (2004) defines NM as the network processes that can be used by small firm owner-managers to manage their marketing activities. NM is defined here as an EM tool based on networking where entrepreneurs and small businesses initially rely in his/her social contacts in order to generate a consumer's network and, in this way, they can transform the structure of his/her social network to increase sales through the influence of word of mouth processes. Hence, NM is the group of networking activities which generate WOM sales in an EM context (Figure 5-1).

Figure 5-1: Network marketing model explained.



The NM model is organized into three parts: dimensions, WOM actors, and strategies. NM dimensions refer to the ways in which researchers can analyze the NM phenomenon, as it is sometimes confusing to research. For example, when Carson et al. (2004) tried to analyze its dimensions (structural, relational, and usage), they did not study the structural part from a node-link perspective (Hoang and Yi, 2015), which could be the reason that the results presented an overlap between the structural and relational dimensions. Moreover, the three dimensions provide a social network analysis perspective for the understanding of NM activities.

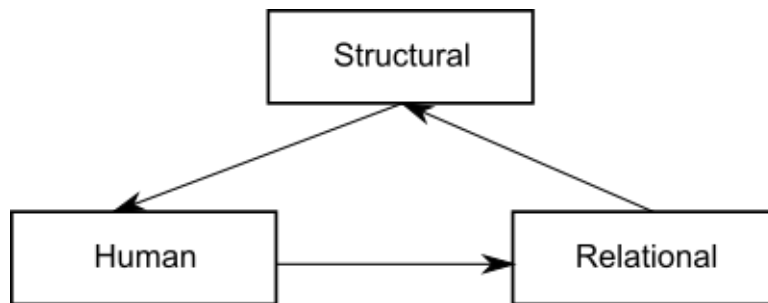
Thereafter, NM actors were proposed: influencers, opinion leaders, and revenue leaders. The importance of WOM actors in an EM context was identified (Chapters 3 and 4) and WOM actors from the WOMM literature were taken and applied in the EM context.

Finally, three NM strategies were proposed: referrals, incentives, and events. It was decided that they would be explained in a section of a Chapter because of their importance for carrying out solutions, according to the reality of entrepreneurs. This is in line with a new social science perspective, which states the need for more solution-oriented research (Watts, 2017).

5.3 Network marketing dimensions

Based on previous studies (Carson et al., 2004; Hoang and Yi, 2015) and social network analysis theory (Borgatti and Foster, 2003), three dimensions were proposed for the NM model as it is shown in Figure 5-2: structural, relational, and human. The structural dimension refers to a network's physical structure, meaning that the links and nodes of a network are measured, so as to understand the WOM process structure. The relational dimension is defined by the content of the links, for example how to generate trust, commitment, and co-operation (Carson et al., 2004). Finally, the human dimension refers to the abilities of a person to connect with others (social), knowledge, habits, and personality (Marvel et al., 2016).

Figure 5-2: Dimensions of network marketing model.



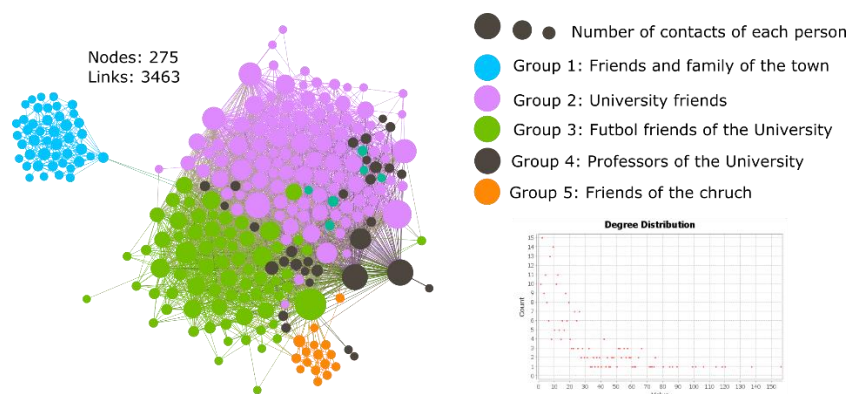
These dimensions allow researchers to investigate the NM model from different perspectives. For example, in this thesis, an artificial market was simulated, in order to analyze the influence of network structure and WOM actors in WOM processes. However, the weight of the links was not considered. Thus, relationships among customers are

assumed to be binaries (absent or present), and in reality, they have different types, such as friends, colleagues, or relatives (Chen et al., 2017).

5.3.1 The structural dimension

Network structure refers to the emerging patterns of direct and indirect ties among actors in this process (Hoang & Antoncic, 2003). Thus, the approach is more in accordance with Hoang & Antoncic's (2003) definition: "The network structure created by the crosscutting relationships between actors, both interpersonal and interorganizational." The network structure in social sciences is important because it may generate influence or control over actors (Burt and Burzynska, 2017). Moreover, depending on the network position of the entrepreneur, it could influence their success (Batjargal, 2010). Additionally, this combination of links and nodes influences the diffusion process of a product (Watts and Dodds, 2007). An example of an online ego social network structure is shown in Figure 25. This figure shows two main groups or clusters of the ego. The position of the ego will allow it to acquire information from the two groups. An example of this research topic is the study contained in the present thesis, in which the influence of network structure on the WOM process was investigated. However, the personality of actors was not considered, nor was the type of relationship, such as friend, colleague, or relative. Therefore, one prospective research topic in network marketing is the structural dimension.

Figure 5-3: Example of a real online social network

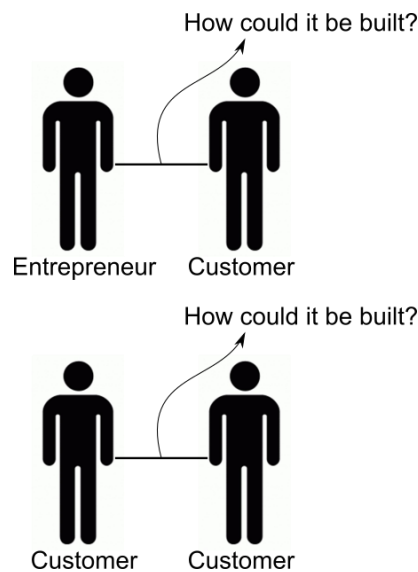


5.3.2 The relational dimension

The relational dimension considers the actual network linkages between an entrepreneur and their marketing contacts. Marketing contacts are those who are customers, or could

bring new customers to the firm. The main goal of an entrepreneur is to create links between unknown people through recommendations, as the example in Figure 5-4. According to Carson et al. (2004), there are three features of the relationship dimension: trust, cooperation, and commitment. Trust refers to confidence in the relationship. Cooperation is the level of interdependence between the entrepreneur and marketing network members. Finally, commitment is the time and effort spent in network linkages, thus, it could be measured by communication frequency. On the other hand, this dimension has shown a positive relationship in firm performance when an owner seeks advice from their social network (Watson, 2007). Further, the diffusion of innovations improves with social relationships and the presence of values, such as truth and common objectives (Ceci and Lubatti, 2012). Thus, the relational dimension lens allows researchers a different point of view of the network marketing model.

Figure 5-4: Relational dimension examples

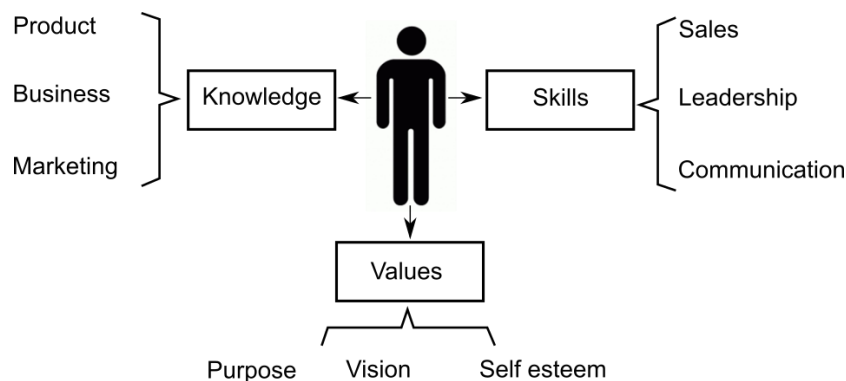


5.3.3 The human dimension

Human capital has been a longstanding area of research, and in the entrepreneurship context, has been linked to entrepreneurial success (Colombo and Grilli, 2005), discovery of new opportunities (Marvel, 2011), and is the most common criteria for venture capitalists (Zacharakis and Meyer, 2000). Thus, this proposal is similar to the new approach of Antonic & Yi (2015) regarding nodal constructs. For example, the ability to form new links is related to the personality of the entrepreneur (Zott and Huy, 2007). Moreover, the entrepreneur's

personality is related to the brokerage position on the social network (Oh and Kilduff, 2008). Some neural process have even been identified related to the position of people within the network (Curley and Ochsner, 2017). Additionally, WOM actors in different network positions use the brain differently in social tasks (O'Donnell et al., 2017). Therefore, this proposal is based on three human areas: skills, knowledge, and values. Entrepreneurs must emerge as leaders from informal networks (Kilduff et al., 2017). Figure 5-5 shows the components of the human dimension.

Figure 5-5: Human dimension



5.4 Network Marketing actors

5.4.1 Influencers

Form a network marketing model, influencers are users or nonusers who have knowledge of a specific topic, interact daily with new users, and can recommend the product. For example, a travel agent recommends a destination to customers because they know about trips and that is their work, however, they do not need to have visited the place. Similarly, a travel agent has expertise on a topic, in this case places to travel. Another example is doctors, who recommend drugs everyday to different people, and patients accepts them because doctors are well-educated on that topic. Additionally, influencers differ from hubs because of the relationship nature and the difficulty of managing a large social network. Therefore, this concept is different from that of Delre et al. (2010). Hubs are omitted in the NM model because they are difficult to find with the number of links, and should be an important element of influence in link strength. For example, in the case of ToS, influencers were librarians, who would recommend ToS to new postgraduate students. They are easy to find, in an entrepreneurial context, and do not necessarily use the product.

5.4.2 Opinion leaders

Opinion leaders refers to “famous” people who use the product, for example, sport stars. These are users with a high level of influence over others, not due to their knowledge of the product, but rather owing to the influence of their work, personality, or job. The president of a country could influence the buying decision process of a product even if they do not know much about it. Also, the concept of hubs was removed, because the type of link is different in opinion leaders. For instance, a celebrity is known by many people, but that does not mean that they will know all of those people. Hence, the relationship is unidirectional. In the case of ToS, opinion leaders could be a recognized researchers who use the web tool, and cite it in their publications.

5.4.3 Revenue leaders

According to the results of Chapter 4, there is a high correlation between the usage and the recommendation process. Users or clients with high usage levels could become product promoters. Even if they do not have a high influence per user in the total amount of WOM sales, the sum of all revenue leaders represents an important percentage. Additionally, they are easy to find, with firm data. However, they have a limitation with the number of contacts they can reach, due to their network structure. They will not expand their social network to promote the product. Therefore, revenue leaders may be defined as users with high product satisfaction levels.

5.5 Network Marketing strategies

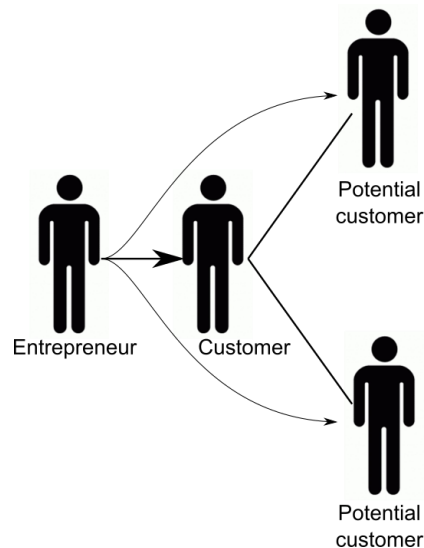
In this part of the Chapter, the main network marketing strategies proposed will be explained, in accordance with the results in Chapters 3 and 4.

5.5.1 Referrals

On a day-to-day basis, entrepreneurs and small firm owners face several challenges in the marketing area. Examples include: What is the best marketing strategy? Should they invest in online marketing programs? Nowadays, they have access to a wide variety of marketing tools. However, the effectivity of these online tools is still minimal, and loss of the marketing budget is easy. According to this study’s results, one of the best networking strategies, which activates WOM sales, are referrals. The referral strategy concerns about asking

current clients to recommend that other customers buy the product. As such, current clients will perform the segmentation process, and product presentations will be more accurate. Also, this process will create a triad between the current client, potential client, and the entrepreneur generating social structure influence, which activates the WOM process. Figure 27 shows a visualization of this process. Finally, if possible, choosing the best connected people will increase the speed of the diffusion process (Ceballos-Cardona et al., 2016).

Figure 5-6: Referral strategy of the network marketing model.



5.5.2 Incentives

Incentives or referral rewards are part of referral programs, and these are a type of WOM marketing also (Haenlein & Libai, 2017). Referral reward programs encourages current clients to recommend products by giving awards depending on the success of the sale. The prize could be money, products or discounts (Peluso et al., 2017). Even though, there is a fine line trod when entrepreneurs give monetary rewards to their clients for bringing new customers (Ryu and Feick, 2007), it is demonstrated that these types of strategies bring value clients (Schmitt et al., 2011). Referral rewards can be applied different depending in the WOM actor. For example, influencers can received a monetary incentive and revenue leaders more products or discounts for their recommendations.

5.5.3 Events

Finally, organizing events such as trade shows, street events, or sponsored events will increase the pace of WOM processes. Entrepreneurs should focus on influencers, in order to increase the speed of the diffusion process.

6. Discussion

In the last few decades, researchers in entrepreneurship have shown the importance of marketing in this field. Despite the large body of research on entrepreneurial marketing, the influence of networking activities on the Word of Mouth (WOM) process remains unclear. In this thesis, whether WOM processes are mainly determined by the network structure, and WOM actors are investigated in an entrepreneurial context. In order to analyze this influence, two experiments were carried out: simulations and mapping of a real technological product's WOM process. In order to create the simulations, an artificial market was built. It represented the common elements of the entrepreneurial context. With the actual data, the referral process for a technological product is studied: Tree of Science (ToS). ToS, a web-tool recommender of scientific literature, located on servers at the Universidad Nacional de Colombia, was created. This addressed the recent call in the literature for a shift from investigation of elements that activate WOM process through networking activities in an entrepreneurial context (Bocconcelli et al. 2016; Resnick et al. 2011). On a more detailed level, the effects of the type of market, ego-network characteristics, and usage were investigated. Table 6-1 shows the summary of the main findings of this thesis. Next, they and their implications for marketing theory and managerial implications will be discussed.

Table 6-1: Summary of hypothesis testing results.

Hypothesis	Accepted?
H1 WOM actors influence WOM processes in the EM context	✓
H2 Network structure influences WOM processes in the EM context	✓

Simulation models provide a way to systematically conduct experiments on the ways in which micro level variables affect diffusion processes (Delre et al., 2010). Recently, Agent-Based Modeling (ABM) has increasingly been used in diffusion studies because it can

overcome some of the limitations of aggregate-level models, such as the assumption of homogeneous adopters, or the lack of explicit social structure (Peres et al. 2010). ABMs have already proven to be useful tools for theoretical diffusion research, and have also demonstrated their potential for practical applications (Garcia, 2005; Kiesling et al., 2012).

In this study, the influence of network size and density on total market sales, sales which spread beyond and are generated outside of the owner's ego-network, was analyzed. Also, which marketing networking strategies are better for the spreading of products through a social network, using an ABM, was evaluated. By applying theoretical findings from marketing networking, social network analysis, complex networks, product diffusion, and consumer decision making in the simulation several findings were revealed. The size and density of networks only seem to be of relevance in social markets. If customers make buying decisions mainly through imitation or social comparison, larger and well-connected networks seem to be advantageous. High density, sizeable networks also enable WOM and viral marketing, tools which have special relevance in social markets, in which people depend on the opinions of others (Trusov et al., 2009). This is in line with the results from Experiment 2, where referral-grow and mix-grow strategies showed the highest sales success in all three markets (average, social, rational) and the highest impact in the social market. To summarize: highly dense and large networks work best in social markets, where referrals are a favorable form of marketing communication. Therefore, this paper sheds light on conflicting results in the area of marketing networking for small firms (Semrau and Werner, 2014), and in particular, on the relationship between ego-network structure and market sales.

7. Conclusions and recommendations

7.1 Introduction

Entrepreneurial Marketing (EM) is a research topic which is emerging as an alternative for small firms, ventures, and companies in uncertain contexts. An important aspect of EM is networking activities, and their influence on the Word-of-Mouth (WOM) process. Nowadays, one's buying decision process relies heavily on the behaviors of friends, relatives, and colleagues. Therefore, the structure of a social network can either increase or decrease a product's speed of the diffusion process. New research technologies, such as Agent-Based Modeling (ABM) and the opportunity to map online interactions, such as recommendation processes, allow researchers to better understand WOM activities.

Throughout this thesis, the focus has been to identify the main elements which activate WOM sales, using networking activities, in an entrepreneurial context. In this Chapter, the research question (Chapter 1) is answered, as are Objective 1 (Chapter 3), Objective 2 (Chapter 4), and Objective 3 (Chapter 5). Next the main conclusions are summarized, and the practical implications of these findings are discussed. Finally, this Chapter concludes with potential routes for future research.

7.2 Principal findings

7.2.1 Network structure influences WOM in the EM context

In Chapter 3, ABM was used to generate an artificial market of 1,000 (Experiment 1) and 2,000 (Experiment 2) potential customers with 10 products. Also, a social network was created, which connected all agents in the model. Additionally, in Chapter 4, a tech product called Tree of Science (ToS) was built, and the only way to access it was through the invitation of an acquaintance. Thus, the entire recommendation process was registered in

the space of one year and the importance of the network structure in WOM was established. This research topic has been studied for a great deal of time, however, the focus of this investigation was the entrepreneurial marketing context, so as to address the research question. Simulation results showed that triads (links between three people) created a better WOM sales effect than application of a random strategy. This means that increasing the number of triads in the network structure also increases the likelihood that a new customer refers the product to their friends. Moreover, the results contained in Chapter 4 showed that distance in the network has a significant, high correlation with customer referrals. For example, if a customer is near the core of the network, there is a higher probability that they will recommend the product.

7.2.2 WOM actors influence on WOM in the EM context

Additionally, in Chapters three and four, the importance of WOM actors is also identified, through simulations and with real WOM data. The percentage of promoters and results showed that the optimum minimum percentage of promoters necessary for an entrepreneur to generate the takeoff phenomenon is 15%. Moreover, according to the real data results (ToS), there are two types of WOM actors: influencers and promoters. Influencers are usually those with a job related to the product, for example, in the case of ToS, influencers were librarians, and so were those who recommend the product because of their work. Promoters are highly satisfied clients who recommend the product to their colleagues. **Hence, network structure and WOM actors are the elements which activate word of mouth sales, using networking strategies, in the entrepreneurial marketing context.** This is the answer to this study's research question.

7.2.3 The Network Marketing Model

Finally, the main objective of this study was to create a model for entrepreneurs or small firm owners, which was called: Network Marketing (NM) (Chapter 5). NM was defined as an EM tool based on networking where entrepreneurs and small businesses initially rely in his/her social contacts in order to generate a consumer's network and, in this way, they can transform the structure of his/her social network to increase sales through the influence of word of mouth processes. A research perspective was also proposed, in order to understand this phenomenon, WOM actors, and strategies which could be applied by entrepreneurs. **The three research lenses are: the structural dimension, relational**

dimension, and human dimension. WOM actors are influencers, opinion leaders, and revenue leaders. Finally, the three strategies are referrals, incentives, and events. Therefore, all thesis objectives were accomplished.

7.3 Managerial implications

In terms of practical implications, small business owners are advised to be sensitive to the level of uncertainty that the majority of their customers perceive when making a purchase decision. If perceived uncertainty is high, it is likely that the business is confronted with a social market, **which then stresses the importance of having large, dense networks in which referrals can be spread easily. If perceived uncertainty is rather low, the business is likely to be confronted with a rational market, and network marketing has no or little effect.** If small business owners are dealing with a social market, but lack large, dense networks, it is recommended that they break into existing networks, controlled by other market players. Approaching opinion leaders might be a good idea, in this regard. Also, as Experiment 2 showed, incentivizing existing contacts to “refer a friend” seems to be a promising approach. As mentioned above, mix-grow is a strategy which might not work very well with small firms. Although recent research shows that a company can intentionally activate its divergent network relations, so as to advance commercialization and innovation success (Aarikka-Stenroos and Sandberg 2012; Aarikka-Stenroos and Lehtimäki 2013), it appears to be challenging for a small firm to create network links between its contacts. Thus, using NM is a marketing approach which fits the characteristics of small firms. However, success depends on the type of market, and the networking strategies employed.

7.4 Future research perspectives and limitations

In terms of future research, it is important to identify the elements that have the most impact on the diffusion processes in marketing networking. For example, the impact of certain key players, promoters, for example, warrants additional research. Also, creative ways to empirically analyze network diffusion processes are needed. In this regard, electronic word-of-mouth and electronic distribution might offer ways to track a product through real networks.

This thesis has a number of limitations, some of which were addressed in Chapter 3 with the simulations. For example, the lack of empirical data of more products. However, collecting empirical data regarding the way in which products make their way through different forms of networks is an almost impossible task. Use of a wide array of theoretical foundations, and their application in the simulation came close to modeling real network WOM processes. In addition, the configuration of this study's simulation, or the parameters used in the simulation, may be criticized. However, the main settings of the simulation were varied, and did no significant impact on results was found. Another limitation of this study is that the type of relationship was not considered, thus, the links are binaries (present or absent). Moreover, a static network and real social networks were created, which were dynamic, for example, people create links with others constantly. However, these static network models have been well accepted in the marketing community (Watts and Dodds 2007; Goldenberg et al. 2010) as a tool for the understanding of a phenomenon.

Even though, the experiments were designed carefully, some of the shortcomings might limit the validity of the outcomes. For example in Chapter 4, the ToS recommendations process was mapped. However, ToS is a technological product (virtual), and its use is free. Thus, not only were the experiments with a single firm but also with one electronic product. Due to this, we suggest further research in different industries, but acknowledge the difficulty of tracking the recommendations process.

A. Appendices for Chapter 3

The simulation code in Netlogo and the data analysis can be found in the next link:

https://github.com/tosrobledog/Thesis/tree/master/Chapter_3

B. Appendices for Chapter 4

The code of the algorithm of Tree of Science and the data analysis of this Chapter can be found in the next link:

https://github.com/tosrobledog/Thesis/tree/master/Chapter_4

C. Appendices for achievements

Research papers

Robledo, S., & Osorio-Zuluaga, G. A. (2012). Potencial de ingresos pasivos para los distribuidores en empresas de mercadeo multinivel con un plan de compensación binario. *Respuestas*, 17(2), 13-20.

Robledo, S., Duque-Méndez, N. D., & Zuluaga-Giraldo, J. I. (2013). Difusión de productos a través de redes sociales: una revisión bibliográfica utilizando la teoría de grafos. *Respuestas*, 18(2), 28-42.

Robledo, S., Osorio, G., & Lopez, C. (2014). Networking en pequeña empresa: una revisión bibliográfica utilizando la teoría de grafos. *Revista vínculos*, 11(2), 6-16.

Zuluaga, M., Robledo, S., Osorio-Zuluaga, G. A., Yathe, L., Gonzalez, D., & Taborda, G. (2016). Metabolomics and pesticides: systematic literature review using graph theory for analysis of references. *Nova*, 14(25), 121-138.

Ceballos-Cardona, Y. B., Robledo, S., & Duque-Méndez, N. D. (2016). Network Marketing en Microempresas. Incidencia de la estrategia de referidos utilizando redes complejas y modelado basado en agentes. *Revista Vínculos*, 13(1).

Marin, J., Robledo, S., & Duque-Méndez, N. D. (2017). Marketing Emprendedor: Una perspectiva cronológica utilizando Tree of Science. *Revista Civilizar de Empresa y Economía*. (accepted).

Research papers sent but not approved

Robledo, S., Eggers, F., Duque-Méndez, N.D. (2016). Does network marketing really help small firms? Simulating sales through agent based modeling and complex networks. Journal of Product Innovation Management. (rejected).

Robledo, S., Eggers, F., Duque-Méndez, N.D. (2016). Does network marketing really help small firms? Simulating sales through agent based modeling and complex networks. Marketing Theory. (rejected).

Congresses

LINKS CENTER SUMMER WORKSHOP. Using the iGraph Package in R. (2017). Lexington, Kentucky U.S.A.

<https://sites.google.com/site/linkscenterworkshop2017/modules/mini-modules1/using-the-igraph-package-in-r>

KARPA UIS. Educación con un enfoque científico igual a innovación: lo que he aprendido de Tree of Science. (2017). Universidad Industrial de Santander. Bucaramanga, Colombia.
<http://www.lauiisquequeremos.com/karpa/documentos/Agenda-Karpa-UIS.pdf>

GLOBAL RESEARCH SYMPOSIUM ON MARKETING AND ENTREPRENEURSHIP. How to activate word of mouth sales?. (2016). San Diego, California U.S.A.
<http://www.entrepreneurialmarketing.biz/previous-meetings.html>

CÁTEDRA EUROPA. Tree of Science: Una herramienta web para la selección de artículos científicos. (2016). Universidad del Norte. Barranquilla, Colombia.

TEDxManizalesED. Retos Educativos en la Innovación Científica. (2016). BIOS. Manizales, Colombia.
https://www.google.com.co/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwj4tuHy6MbYAhVCdt8KHx9QBdAQtwIIKjAA&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DUAU2r00ueqE&usg=AOvVaw2XvNbA4Psr_JtZPUfAPDuu

GLOBAL RESEARCH SYMPOSIUM ON MARKETING AND ENTREPRENEURSHIP. A review of Entrepreneurial Marketing using Tree of Science. (2015). Chicago, Illinois U.S.A.
<http://www.entrepreneurialmarketing.biz/previous-meetings.html>

III INTERNATIONAL SEMINAR FOR SOCIAL NETWORK ANALYSIS OF COLOMBIA. Tree of Science: Una herramienta web para el análisis de citaciones. (2015). Manizales, Colombia.

GLOBAL RESEARCH SYMPOSIUM ON MARKETING AND ENTREPRENEURSHIP. Understanding the Marketing Networking in SMEs through a simulation of Agent-Based Modeling with Complex Networks. (2014). Santa Cruz, California U.S.A.
<http://www.entrepreneurialmarketing.biz/previous-meetings.html>

II INTERNATIONAL SEMINAR FOR SOCIAL NETWORK ANALYSIS OF COLOMBIA. Simulation of a multilevel network as a scale-free network to know the financial dynamic of multilevel marketing business with binary system payment (2012). Cartagena Colombia
<https://evoluntas.wordpress.com/2013/04/11/ars-colombia-2013/>

Research Projects

Call title	Project title
“Fomento de una Cultura de la Innovación en la Universidad Nacional de Colombia 2013-2015”	“Herramienta Web para la Selección Inteligente de Artículos Científicos Aplicando el Análisis de Redes”
“Convocatoria interna de Investigación de la Facultad de Administración 2015, para la Formulación y Ejecución de Proyectos de Consolidación y/o fortalecimiento de los Grupos de Investigación”	“Consolidación de las líneas de Investigación del Grupo de Investigación en Ambientes Inteligentes Adaptativos GAIA”

Master Thesis Co-mentoring

Years	Master student	Thesis or paper title	Program
2016-	John Eider Vásquez Hernández	Networking como una herramienta del modelo effectual: análisis de la estructura del networking de los emprendedores de Manizales.	Magister in Business Administration
2014-2017	Jimena Echeverry Cardona	Networking a partir del Marketing Emprendedor: Una estrategia con promotores para activar los procesos del Word of Mouth usando Modelado Basado en Agentes y redes complejas.	Magister in Business Administration
2015-2017	Johanna Andrea Duque López	Marketing en Redes Sociales Online como una herramienta de Marketing Emprendedor.	Magister in Business Administration
2014-2015	Yorely Bryeth Ceballos Cardona	Network marketing en microempresas. Incidencia de la estrategia de referidos utilizando redes complejas y modelado basado en agente	Magister in Business Administration
2013-2014	Carolina López Espinosa	Networking en pequeña empresa: una revisión bibliográfica utilizando la teoría de grafos	Magister in Business Administration
2012-2015	Jorge Ivan Zuluaga Giraldo	Difusión de productos a través de redes sociales: una revisión bibliográfica utilizando la teoría de grafos	Magister in Business Administration

Classes

2015-2016	Occasional Professor ad honorem	Social Network Analysis	Departament of Informatics and Computing, Universidad Nacional de Colombia - Sede Manizales.
-----------	---------------------------------	-------------------------	--

Internships

2017	Professor Mehra, University of Kentucky, U.S. (3 months)	(1) I designed and delivered lectures on R and social network analyses to MBA and PhD students; (2) participated in the LINKS annual workshop and led a module on tools for network visualization; and (3) helped a Ph.D. student and professor Ajay to analyze data for a research project—which examines how network perceptions influence turnover and commitment in a learning network based in the Netherlands
2014	Professor Eggers, Menlo College, California, U.S. (6 months)	I worked on the application of Agent-Based Modeling and Complex Networks in Marketing Networking for micro owners.

Honors and awards

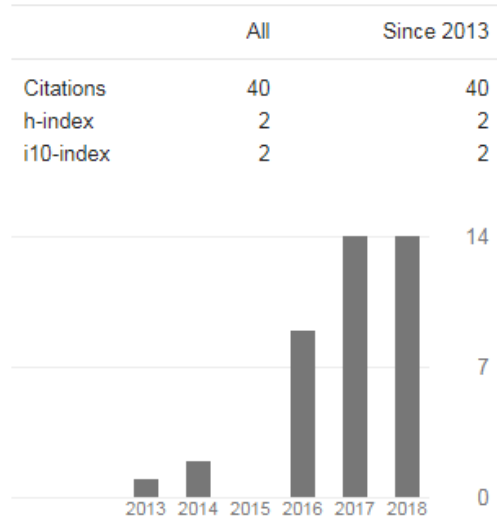
- 2016 Kauffman Fellow of the 2016 AMA Marketing and Entrepreneurship SIG Doctoral Consortium and Research Symposium, July. San Diego.
- 2015 Kauffman Fellow of the 2015 AMA Marketing and Entrepreneurship SIG Doctoral Consortium and Research Symposium, July. Chicago.
- Recognition of the innovative spirit 2015. National Directorate of Extension, Innovation and Intellectual Property of Universidad Nacional de Colombia.
- 2014 Kauffman Fellow of the 2014 AMA Marketing and Entrepreneurship SIG Doctoral Consortium and Research Symposium, July. California
- 2013 Scholarship for PhD Students (Beca Generación de Bicentenario para estudios de doctorado en Colombia). Colciencias.

Software register

The Tree of Science software was registered by Universidad Nacional de Colombia with the number 13-62-226.

Google Scholar

<https://scholar.google.com/citations?user=RGUTAfEAAAQJ&hl=en>



References

- Aarikka-Stenroos, L., & Lehtimäki, T. (2013). Building up a firm's commercialisation competence: from product concept to the first reference. *International Journal of Technology Marketing*, 8(2), 177–196.
- Aarikka-Stenroos, L., & Sandberg, B. (2012). From new-product development to commercialization through networks. *Journal of Business Research*, 65(2), 198–206.
- Aarikka-Stenroos, L., Sandberg, B., & Lehtimäki, T. (2014). Networks for the commercialization of innovations: A review of how divergent network actors contribute. *Industrial Marketing Management*, 43(3), 365–381.
- Ahuja, G., Soda, G., & Zaheer, A. (2012). The Genesis and Dynamics of Organizational Networks. *Organization Science*, 23(2), 434–448. <https://doi.org/10.1287/orsc.1110.0695>
- Ahmadi, H., & O'Cass, A. (2016). The role of entrepreneurial marketing in new technology ventures first product commercialisation. *Journal of Strategic Marketing*, 24(1), 47–60.
- Ahn, Y.-Y., Han, S., Kwak, H., Moon, S., & Jeong, H. (2007). Analysis of topological characteristics of huge online social networking services. In *Proceedings of the 16th international conference on World Wide Web - WWW '07*. <https://doi.org/10.1145/1242572.1242685>
- Alford, P., & Page, S. J. (2015). Marketing technology for adoption by small business. *The Service Industries Journal*, 35(11-12), 655–669.

- Amaral, L. a, Scala, A., Barthélemy, M., & Stanley, H. E. (2000). Classes of small-world networks. *Proceedings of the National Academy of Sciences of the United States of America*, 97(21), 11149–11152.
- Anwar, M. N., & Daniel, E. (2016). Entrepreneurial marketing in online businesses: The case of ethnic minority entrepreneurs in the UK. *Qualitative Market Research: An International Journal*, 19(3), 310–338.
- Arndt, J. (1967). Role of Product-Related Conversations in the Diffusion of a New Product. *Journal of Marketing Research*, 4(3), 291. <https://doi.org/10.2307/3149462>
- Babić Rosario, A., Sotgiu, F., De Valck, K., & Bijmolt, T. H. A. (2016). The Effect of Electronic Word of Mouth on Sales: A Meta-Analytic Review of Platform, Product, and Metric Factors. *JMR, Journal of Marketing Research*, 53(3), 297–318.
- Baglieri, D., & Lorenzoni, G. (2014). Closing the distance between academia and market: experimentation and user entrepreneurial processes. *The Journal of Technology Transfer*, 39(1), 52–74.
- Baker, A. M., Donthu, N., & Kumar, V. (2016). Investigating How Word-of-Mouth Conversations About Brands Influence Purchase and Retransmission Intentions. *JMR, Journal of Marketing Research*, 53(2), 225–239.
- Bampo, M., Ewing, M. T., Mather, D. R., Stewart, D., & Wallace, M. (2008). The effects of the social structure of digital networks on viral marketing performance. *Information Systems Research*, 19(3), 273–290. <https://doi.org/10.1287/isre.1070.0152>
- Bao, T., & Chang, T.-L. S. (2014). Finding disseminators via electronic word of mouth message for effective marketing communications. *Decision Support Systems*, 67, 21–29.
- Barabási, A.-L., Albert, R., & Jeong, H. (1999). Mean-field theory for scale-free random networks. *Statistical Mechanics and Its Applications*, 272(1), 173–187.

- Barrot, C., Becker, J. U., & Meyners, J. (2013). Impact of service pricing on referral behaviour. *European Journal of Marketing*, 47(7), 1052–1066.
- Barthélemy, M., Barrat, A., Pastor-Satorras, R., & Vespignani, A. (2005). Dynamical patterns of epidemic outbreaks in complex heterogeneous networks. *Journal of Theoretical Biology*, 235(2), 275–288.
- Bass, F. M. (1969). A New Product Growth for Model Consumer Durables. *Management Science*, 15(5), 215–227. <https://doi.org/10.1287/mnsc.1040.0264>
- Batjargal, B. (2003). Social capital and entrepreneurial performance in Russia: A longitudinal study. *Organization studies*, 24(4), 535-556.
- Batjargal, B. (2005). Entrepreneurial versatility, resources and firm performance in Russia: A panel study. *International Journal of Entrepreneurship and Innovation Management*, 5(3), 284–297.
- Batjargal, B. (2010). The effects of network's structural holes: polycentric institutions, product portfolio, and new venture growth in China and Russia. *Strategic Entrepreneurship Journal*, 4(2), 146–163.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529.
- Bensaou, B. M., Galunic, C., & Jonczyk-Sédès, C. (2014). Players and Purists: Networking Strategies and Agency of Service Professionals. *Organization Science*, 25(1), 29–56.
- Berman, B. (2016). Referral marketing: Harnessing the power of your customers. *Business Horizons*, 59(1), 19–28. <https://doi.org/10.1016/j.bushor.2015.08.001>
- Bhuiyan, S. N., Menguc, B., & Bell, S. J. (2005). Just entrepreneurial enough: The moderating effect of entrepreneurship on the relationship between market orientation and performance.

Journal of Business Research, 58(1 SPEC.ISS), 9–17. [https://doi.org/10.1016/S0148-2963\(03\)00074-2](https://doi.org/10.1016/S0148-2963(03)00074-2)

Bocconcelli, R., Cioppi, M., Fortezza, F., Francioni, B., Pagano, A., Savelli, E., & Splendiani, S. (2016). SMEs and Marketing: A Systematic Literature Review: SMEs and Marketing. *International Journal of Management Reviews*, 21, 100.

Bohlmann, J. D., Calantone, R. J., & Meng, Z. (2010). The Effects of Market Network Heterogeneity on Innovation Diffusion: An Agent-Based Modeling Approach. *Journal of Product Innovation Management*, 27(5), 741–760.

Borgatti, S. P., & Foster, P. C. (2003). The Network Paradigm in Organizational Research: A Review and Typology. *Journal of Management*, 29(6), 991–1013.

Borshchev, A., & Filippov, A. (2004, July). From system dynamics and discrete event to practical agent based modeling: reasons, techniques, tools. In *Proceedings of the 22nd international conference of the system dynamics society* (Vol. 22).

Boso, N., Story, V. M., & Cadogan, J. W. (2013). Entrepreneurial orientation, market orientation, network ties, and performance: Study of entrepreneurial firms in a developing economy. *Journal of Business Venturing*, 28(6), 708–727.

Brown, J. J., & Reingen, P. H. (1987). Social ties and Word-of-Mouth referral behavior. *Journal of Consumer Research*, 14(3), 350–362.

Brewer, M. B., & Kramer, R. M. (1986). Choice behaviour in social dilemmas: Effects of social identity, group size and decision framing. *Journal of Personality and Social Psychology*, 50(3), 543–549.

Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly*, 42(2), 339–365.

- Burt, R. S. (2004). Structural Holes and Good Ideas. *The American Journal of Sociology*, 110(2), 349–399.
- Burt, R. S. (2005). *Brokerage and closure: An introduction to social capital* (Oxford Uni). Oxford.
- Burt, R. S., & Burzynska, K. (2017). Chinese Entrepreneurs, Social Networks, and Guanxi. *Management and Organization Review*, 13(02), 221–260.
- Cai, L., Guo, R., Fei, Y., & Liu, Z. (2017). Effectuation, Exploratory Learning and New Venture Performance: Evidence from China: Journal of Small Business Management. *Journal of Small Business Management*, 55(3), 388–403.
- Carson, D., & Cromie, S. (1990). Marketing planning in small enterprises: A model and some empirical evidence. *Journal of Consumer Marketing*, 7(3), 5–18.
- Carson, D., Cromie, S., McGowan, P. and Hill, J. (1995), *Marketing and Entrepreneurship in SMEs*, Prentice-Hall, Englewood Cliffs, NJ
- Carson, D., Gilmore, A., & Rocks, S. (2004). SME marketing networking: a strategic approach. *Strategic Change*, 13(7), 369–382.
- Ceballos-Cardona, Y. B., Robledo, S., & Duque-Méndez, N. D. (2016). Network marketing en microempresas. Incidencia de la estrategia de referidos utilizando redes complejas y modelado basado en agentes. *Vinculos*, 13(1), 6–16.
- Ceci, F., & Iubatti, D. (2012). Personal relationships and innovation diffusion in SME networks: A content analysis approach. *Research Policy*, 41(3), 565–579.
- Centola, D. (2010). The spread of behavior in an online social network experiment. *Science*, 329(5996), 1194–1197.
- Chae, I., Stephen, A. T., Bart, Y., & Yao, D. (2017). Spillover Effects in Seeded Word-of-Mouth Marketing Campaigns. *Marketing Science*, 36(1), 89–104.

- Chen, Y., Wang, Q., & Xie, J. (2011). Online Social Interactions: A Natural Experiment on Word of Mouth Versus Observational Learning. *Journal of Marketing Research*, 48(2), 238–254. <https://doi.org/10.1509/jmkr.48.2.238>
- Chen, X., van der Lans, R., & Phan, T. Q. (2017). Uncovering the Importance of Relationship Characteristics in Social Networks: Implications for Seeding Strategies. *JMR, Journal of Marketing Research*, 54(2), 187–201.
- Chevalier, J. A., & Mayzlin, D. (2003). The Effect of Word of Mouth on Sales: Online Book Reviews. *Journal of Marketing Research*, 43(3), 345–354.
- Choi, H., Kim, S.-H., & Lee, J. (2010). Role of network structure and network effects in diffusion of innovations. *Industrial Marketing Management*, 39(1), 170–177.
- Choi, S. B., & Williams, C. (2016). Entrepreneurial orientation and performance: mediating effects of technology and marketing action across industry types. *Industry and Innovation*, 23(8), 673–693.
- Chollet, B., Géraudel, M., & Mothe, C. (2014). Generating Business Referrals for SMEs: The Contingent Value of CEOs' Social Capital. *Journal of Small Business Management*, 52(1), 79–101.
- Close, A. G., Zachary Finney, R., Lacey, R. Z., & Sneath, J. Z. (2006). Engaging the Consumer through Event Marketing: Linking Attendees with the Sponsor, Community, and Brand. *Journal of Advertising Research*, 46(4), 420–433.
- Coleman, J. (1990). *Foundations of social theory*. Belknap Press. Cambridge, MA.
- Colombo, M. G., & Grilli, L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, 34(6), 795–816.

- Covin, J. G., & Slevin, D. P. (1990). New venture strategic posture, structure, and performance: An industry life cycle analysis. *Journal of Business Venturing*, 5(2), 123–135. [https://doi.org/http://dx.doi.org/10.1016/0883-9026\(90\)90004-D](https://doi.org/http://dx.doi.org/10.1016/0883-9026(90)90004-D)
- Curley, J. P., & Ochsner, K. N. (2017). Neuroscience: Social networks in the brain. *Nature Human Behaviour*, 1(5), 0104.
- Daniel, E. M., Domenico, M. D., & Sharma, S. (2015). Effectuation and home-based online business entrepreneurs. *International Small Business Journal*, 33(8), 799–823.
- Miles, M., & Darroch, J. (2006). Large firms, entrepreneurial marketing processes, and the cycle of competitive advantage. *European Journal of Marketing*, 40(5/6), 485–501. <https://doi.org/10.1108/03090560610657804>
- De Bruyn, A., & Lilien, G. L. (2008). A multi-stage model of word-of-mouth influence through viral marketing. *International Journal of Research in Marketing*, 25(3), 151–163.
- Dellarocas, C. (2003). The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms. *Management Science*, 49(10), 1407–1424. <https://doi.org/10.1287/mnsc.49.10.1407.17308>
- Delre, S. A., Jager, W., Bijmolt, T. H. A., & Janssen, M. A. (2010). Will It Spread or Not? The Effects of Social Influences and Network Topology on Innovation Diffusion. *Journal of Product Innovation Management*, 27(2), 267–282.
- Martin, D. (2009). The entrepreneurial marketing mix. *Qualitative Market Research: An International Journal*, 12(4), 391–403. <https://doi.org/10.1108/13522750910993310>
- Dragnić, D. (2009) Marketing activities of small businesses in Croatia: the case of splitko-dalmatinska county, *Management: Journal of Contemporary Management* 14(1), 39–58.
- Doganoglu, T., & Grzybowski, L. (2007). Estimating network effects in mobile telephony in Germany. *Information Economics and Policy*, 19(1), 65–79.

- Dubois, D., Bonezzi, A., & De Angelis, M. (2016). Sharing with Friends Versus Strangers: How Interpersonal Closeness Influences Word-of-Mouth Valence. *JMR, Journal of Marketing Research*, 53(5), 712–727.
- Eggers, F., Kraus, S., & Covin, J. G. (2014). Traveling into unexplored territory: Radical innovativeness and the role of networking, customers, and technologically turbulent environments. *Industrial Marketing Management*.
<https://doi.org/10.1016/j.indmarman.2014.08.006>
- Eggers, F., Hatak, I., Kraus, S., & Niemand, T. (2017). Technologies That Support Marketing and Market Development in SMEs-Evidence from Social Networks: JOURNAL OF SMALL BUSINESS MANAGEMENT. *Journal of Small Business Management*, 55(2), 270–302.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook “Friends:” Social Capital and College Students’ Use of Online Social Network Sites. *Journal of Computer-Mediated Communication: JCMC*, 12(4), 1143–1168.
- Engelen, A., Schmidt, S., & Buchsteiner, M. (2015). The Simultaneous Influence of National Culture and Market Turbulence on Entrepreneurial Orientation: A Nine-country Study. *Journal of International Management*, 21(1), 18–30.
- Engel, Y., Kaandorp, M., & Elfring, T. (2017). Toward a dynamic process model of entrepreneurial networking under uncertainty. *Journal of Business Venturing*, 32(1), 35–51.
- Ferreira, J. J., Fayolle, A., Fernandes, C., & Raposo, M. (2017). Effects of Schumpeterian and Kirznerian entrepreneurship on economic growth: panel data evidence. *Entrepreneurship and Regional Development*, 29(1-2), 27–50.
- Fritsch, M., & Kauffeld-Monz, M. (2010). The impact of network structure on knowledge transfer: an application of social network analysis in the context of regional innovation networks. *The Annals of Regional Science*, 44(1), 21–38.

- Galkina, T., & Chetty, S. (2015). Effectuation and Networking of Internationalizing SMEs. *Management International Review*, 55(5), 647–676.
- Gan, C., Yang, X., Liu, W., Zhu, Q., Jin, J., & He, L. (2014). Propagation of computer virus both across the Internet and external computers: A complex-network approach. *Communications in Nonlinear Science and Numerical Simulation*, 19(8), 2785–2792.
- Garcia, R. (2005). Uses of Agent-Based Modeling in Innovation/New Product Development Research*. *Journal of Product Innovation Management*, 22(5), 380–398. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1540-5885.2005.00136.x/full>
- Gilmore, A. (2011). Entrepreneurial and SME marketing. *Journal of Research in Marketing and Entrepreneurship*, 13(2), 137–145.
- Gilmore, A., & Carson, D. (1999). Entrepreneurial marketing by networking. *New England Journal of Entrepreneurship*, 2(2), 31–38.
- Gilmore, A., David, C., Grant, K., Aodheen, O., Laney, R., & Pickett, B. (2006). NETWORKING IN SMEs: FINDINGS FROM AUSTRALIA AND IRELAND. *Irish Marketing Review*, 18(1/2), 21–28.
- Godes, D. (2016). Product Policy in Markets with Word-of-Mouth Communication. *Management Science*. <https://doi.org/10.1287/mnsc.2015.2330>
- Godes, D., David, G., & Dina, M. (2004). Using Online Conversations to Study Word-of-Mouth Communication. *Marketing Science*, 23(4), 545–560.
- Godes, D., & Mayzlin, D. (2009). Firm-Created Word-of-Mouth Communication: Evidence from a Field Test. *Marketing Science*, 28(4), 721–739.
- Goldenberg, J., Han, S., Lehmann, D. R., & Hong, J. W. (2009). The Role of Hubs in the Adoption Process. *Journal of Marketing*, 73(2), 1–13.

- Goldenberg, J., Libai, B., & Muller, E. (2010). The chilling effects of network externalities. *International Journal of Research in Marketing*, 27(1), 4–15.
- Granovetter, M. S. (1977). The Strength of Weak Ties. In *Social Networks* (pp. 347–367).
- Gumbau Albert, M. (2017). Entrepreneurship, innovation and regional performance: application for the Spanish regions. *Entrepreneurship and Regional Development*, 29(3-4), 271–291.
- Gupta, S., Hanssens, D., Hardie, B., Kahn, W., Kumar, V., Lin, N., ... Sriram, S. (2006). Modeling Customer Lifetime Value. *Journal of Service Research*, 9(2), 139–155.
- Haenlein, M. (2011). A social network analysis of customer-level revenue distribution. *Marketing Letters*, 22(1), 15–29.
- Haenlein, M., & Libai, B. (2017). Seeding, Referral, and Recommendation: Creating Profitable Word-of-Mouth Programs. *California Management Review*, 59(2), 68–91.
- Haenlein, M., Michael, H., & Barak, L. (2013). Targeting Revenue Leaders for a New Product. *Journal of Marketing*, 77(3), 65–80.
- Hakala, H. (2011). Strategic Orientations in Management Literature: Three Approaches to Understanding the Interaction between Market, Technology, Entrepreneurial and Learning Orientations: Orientations in Management Literature. *International Journal of Management Reviews*, 13(2), 199–217.
- Hakimpoor, H., Tat, H. H., Khani, N., & Samani, M. B. (2011). Marketing networking dimensions (Mnds) and Smes' Performance: A new conceptual model. *Australian Journal of Basic and Applied Sciences*, 5(10), 1528–1533.
- Hatchaleelaha, S., & Wongsurawat, W. (2016). Multilevel marketing and entrepreneurship in Thailand: A case study. *Journal of Research in Marketing and Entrepreneurship*, 18(1), 146–160.

- Hennig-Thurau, T., Wiertz, C., & Feldhaus, F. (2015). Does Twitter matter? The impact of microblogging word of mouth on consumers' adoption of new movies. *Journal of the Academy of Marketing Science*, 43(3), 375–394.
- Hill, J. (2001). A multidimensional study of the key determinants of effective SME marketing activity: Part 1. *International Journal of Entrepreneurial Behavior & Research*, 7(5), 171–204.
- Hills, G. E., & Hultman, C. M. (2011). Academic Roots: The Past and Present of Entrepreneurial Marketing. *International Journal of Entrepreneurship & Small Business*, 24(1), 1–10.
- Hills, G. E., Hultman, C. M., & Miles, M. P. (2008). The Evolution and Development of Entrepreneurial Marketing. *Journal of Small Business Management*, 46(1), 99–112.
- Hill, S., Provost, F., & Volinsky, C. (2006). Network-Based Marketing: Identifying Likely Adopters via Consumer Networks. *Statistical Science: A Review Journal of the Institute of Mathematical Statistics*, 21(2), 256–276.
- Hinz, O., Oliver, H., Bernd, S., Christian, B., & Becker, J. U. (2011). Seeding Strategies for Viral Marketing: An Empirical Comparison. *Journal of Marketing*, 75(6), 55–71.
- Hoang, H., & Antoncic, B. (2003). Network-based research in entrepreneurship. *Journal of Business Venturing*, 18(2), 165–187.
- Hoang, H., & Yi, A. (2015). Network-based Research in Entrepreneurship: A Decade in Review. *Foundations and Trends® in Entrepreneurship*, 11(1), 1–54.
- Huggins, R., & Thompson, P. (2015). Entrepreneurship, innovation and regional growth: a network theory. *Small Business Economics*, 45(1), 103–128.
- Hu, Y. (2013). Hyperlinked actors in the global knowledge communities and diffusion of innovation tools in nascent industrial field. *Technovation*, 33(2-3), 38–49.

- Iyengar, R., Van den Bulte, C., & Valente, T. W. (2011). Opinion Leadership and Social Contagion in New Product Diffusion. *Marketing Science*, 30(2), 195–212.
- Janssen, M. A., & Jager, W. (2001). Fashions, habits and changing preferences: Simulation of psychological factors affecting market dynamics. *Journal Of Economic Psychology*, 22(6), 745–772.
- Janssen, M. A., & Jager, W. (2003). Simulating market dynamics: interactions between consumer psychology and social networks. *Artificial Life*, 9(4), 343–356.
- Kiesling, E., Günther, M., Stummer, C., & Wakolbinger, L. M. (2012). Agent-based simulation of innovation diffusion: a review. *Central European Journal of Operations Research*, 20(2), 183–230. <https://doi.org/10.1007/s10100-011-0210-y>
- Kohli, A., & Jaworski, B. (1990). Market orientation: the construct, research propositions, and managerial implications. *The Journal of Marketing*, 54(2), 1–18. Retrieved from <http://www.jstor.org/stable/10.2307/1251866>
- Janssen, M. A., & Jager, W. (2001). Fashions, habits and changing preferences: Simulation of psychological factors affecting market dynamics. *Journal of Economic Psychology*, 22, 745–772.
- Janssen, M. A., & Jager, W. (2003). Simulating market dynamics: interactions between consumer psychology and social networks. *Artificial Life*, 9(4), 343–56.
- Jiang, G., Tadikamalla, P. R., Shang, J., & Zhao, L. (2016). Impacts of knowledge on online brand success: an agent-based model for online market share enhancement. *European Journal of Operational Research*, 248(3), 1093–1103.
- Jones, B. (2010). Entrepreneurial marketing and the Web 2.0 interface. *Journal of Research in Marketing and Entrepreneurship*, 12(2), 143–152.

- Jones, O., & Li, H. (2017). Effectual entrepreneuring: sensemaking in a family-based start-up. *Entrepreneurship and Regional Development*, 29(5-6), 467–499.
- Jones, R., & Rowley, J. (2011). Entrepreneurial marketing in small businesses: A conceptual exploration. *INTERNATIONAL SMALL BUSINESS JOURNAL*, 29(1), 25–36.
- Jones, R., Suoranta, M., & Rowley, J. (2013). Strategic network marketing in technology SMEs. *Journal of Marketing Management*, 29(5-6), 671–697.
- Karsai, M., Iñiguez, G., Kaski, K., & Kertész, J. (2014). Complex contagion process in spreading of online innovation. *Journal of the Royal Society*, 11(101), 27.
- Katona, Z., Zubcsek, P. P., & Sarvary, M. (2011). Network Effects and Personal Influences: The Diffusion of an Online Social Network. *JMR, Journal of Marketing Research*, 48(3), 425–443.
- Katz, E., & Lazarsfeld, P. F. (1966). *Personal Influence, The part played by people in the flow of mass communications*. Transaction Publishers.
- Kermack, W. O., & McKendrick, A. G. (1927). A Contribution to the Mathematical Theory of Epidemics. In *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* (Vol. 115, pp. 700–721).
- Kilduff, M., Mehra, A., (Denny) Gioia, D. A., & Borgatti, S. (2017). Brokering Trust to Enhance Leadership: A Self-Monitoring Approach to Leadership Emergence. In *Knowledge and Space* (pp. 221–240).
- Kilenthong, P., Hultman, C. M., & Hills, G. E. (2016). Entrepreneurial marketing behaviours: impact of firm age, firm size and firm's founder. *Journal of Research in Marketing and Entrepreneurship*, 18(1), 127–145.
- Kiss, C., & Bichler, M. (2008). Identification of influencers — Measuring influence in customer networks. *Decision Support Systems*, 46(1), 233–253.

- Kitsak, M., Gallos, L. K., Havlin, S., Liljeros, F., Muchnik, L., Stanley, H. E., & Makse, H. A. (2010). Identification of influential spreaders in complex networks. *Nature Physics*, 6(11), 888–893.
- Kropp, F., Lindsay, N. J., & Shoham, A. (2006). Entrepreneurial, market, and learning orientations and international entrepreneurial business venture performance in South African firms. *International Marketing Review*. <https://doi.org/10.1108/02651330610703427>
- Kocak, A., Carsrud, A., & Oflazoglu, S. (2017). Market, entrepreneurial, and technology orientations: impact on innovation and firm performance. *Management Decision*, 55(2), 248–270.
- Kohli, A., & Jaworski, B. (1990). Market orientation: the construct, research propositions, and managerial implications. *The Journal of Marketing*, 54(2), 1–18. Retrieved from <http://www.jstor.org/stable/10.2307/1251866>
- Kozinets, R. V., de Valck, K., Wojnicki, A. C., & Wilner, S. J. S. (2010). Networked Narratives: Understanding Word-of-Mouth Marketing in Online Communities. *Journal of Marketing*, 74(2), 71–89.
- Leonard-Barton, D. (1985). Experts as Negative Opinion Leaders in the Diffusion of a Technological Innovation. *The Journal of Consumer Research*, 11(4), 914.
- Litan, R. E. (2010). Inventive Billion Dollar Firms: A Faster Way to Grow. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1721608>
- Liu, S., Jiang, C., Lin, Z., Ding, Y., Duan, R., & Xu, Z. (2015). Identifying effective influencers based on trust for electronic word-of-mouth marketing: A domain-aware approach. *Information Sciences*, 306, 34–52.
- Liu-Thompkins, Y. (2012). Seeding Viral Content: The Role of Message and Network Factors. *Journal of Advertising Research*, 52(4), 465–478.

- Liu, Y., & Yong, L. (2006). Word of Mouth for Movies: Its Dynamics and Impact on Box Office Revenue. *Journal of Marketing*, 70(3), 74–89.
- Li, Y., Zhao, Y., Tan, J., & Liu, Y. (2008). Moderating Effects of Entrepreneurial Orientation on Market Orientation-Performance Linkage: Evidence from Chinese Small Firms*. *Journal of Small Business Management*, 46(1), 113–133.
- Lu, D., Li, Q., & Liao, S. S. (2012). A graph-based action network framework to identify prestigious members through member's prestige evolution. *Decision Support Systems*, 53(1), 44–54.
- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the Entrepreneurial Orientation Construct and Linking It to Performance. *The Academy of Management Review*, 21(1), 135. <https://doi.org/10.2307/258632>
- Ma, L., Krishnan, R., & Montgomery, A. L. (2015). Latent Homophily or Social Influence? An Empirical Analysis of Purchase Within a Social Network. *Management Science*, 61(2), 454–473.
- Macal, C. M., & North, M. J. (2010). Tutorial on agent-based modelling and simulation. *Journal of Simulation*, 4(3), 151–162. <https://doi.org/10.1057/jos.2010.3>
- Marin, J., Robledo, S., & Duque-Méndez, N. D. (2017). Marketing Emprendedor: Una perspectiva cronológica utilizando Tree of Science. *Revista Civilizar de Empresa y Economía*. (accepted).
- Martin, S. L., & Javalgi, R. (raj) G. (2016). Entrepreneurial orientation, marketing capabilities and performance: The Moderating role of Competitive Intensity on Latin American International New Ventures. *Journal of Business Research*, 69(6), 2040–2051.
- Marvel, M. R. (2011). Human Capital and Search-Based Discovery: A Study of High-Tech Entrepreneurship. *Entrepreneurship Theory and Practice*, 37(2), 403–419.

- Marvel, M. R., Davis, J. L., & Sproul, C. R. (2016). Human Capital and Entrepreneurship Research: A Critical Review and Future Directions. *Entrepreneurship Theory and Practice*, 40(3), 599–626.
- Matsuno, K., Mentzer, J., & Özsomer, A. (2002). The effects of entrepreneurial proclivity and market orientation on business performance. *The Journal of Marketing*, 66(3), 18–32. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/cbdv.200490137/abstract>
- Mbura, O. K. (2014). The effectiveness of entrepreneurial networks in the acquisition of marketing information (MI) resources: selected small manufacturing firms. *Business Management Review*, 17(1), 97–121.
- Mehra, A., Smith, B. R., Dixon, A. L., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly*, 17(3), 232–245.
- Miles, M., & Darroch, J. (2006). Large firms, entrepreneurial marketing processes, and the cycle of competitive advantage. *European Journal of Marketing*, 40(5/6), 485–501. <https://doi.org/10.1108/03090560610657804>
- Miles, M., Gilmore, A., Harrigan, P., Lewis, G., & Sethna, Z. (2015). Exploring entrepreneurial marketing. *Journal of Strategic Marketing*, 23(2), 94–111. <https://doi.org/10.1080/0965254X.2014.914069>
- Miller, D. (1983). The Correlates of Entrepreneurship in Three Types of Firms. *Management Science*, 29(7), 770–791.
- Moldovan, S., Muller, E., Richter, Y., & Yom-Tov, E. (2017). Opinion leadership in small groups. *International Journal of Research in Marketing*, 34(2), 536–552.
- Morgan, T., Anokhin, S., & Wincent, J. (2016). Entrepreneurial orientation, firm market power and opportunism in networks. *Journal of Business & Industrial Marketing*, 31(1), 99–111.

- Morris, M. H., Schindehutte, M., & LaForge, R. W. (2002). Entrepreneurial Marketing: A Construct for Integrating Emerging Entrepreneurship and Marketing Perspectives. *Journal of Marketing Theory and Practice*, 10(4), 1–19.
- Mukherjee, P. (2014). How chilling are network externalities? The role of network structure. *International Journal of Research in Marketing*, 31(4), 452–456.
- Nam, S., Manchanda, P., & Chintagunta, P. K. (2010). The Effect of Signal Quality and Contiguous Word of Mouth on Customer Acquisition for a Video-on-Demand Service. *Marketing Science*, 29(4), 690–700. <https://doi.org/10.1287/mksc.1090.0550>
- Narver, J. C., & Slater, S. F. (1990). The Effect of a Market Orientation on Business Profitability. *Journal of Marketing*, 54(4), 20.
- Naudé, P., Zaefarian, G., Najafi Tavani, Z., Neghabi, S., & Zaefarian, R. (2014). The influence of network effects on SME performance. *Industrial Marketing Management*, 43(4), 630–641. <https://doi.org/10.1016/j.indmarman.2014.02.004>
- Nejad, M. G., Amini, M., & Sherrell, D. L. (2016). The profit impact of revenue heterogeneity and assortativity in the presence of negative word-of-mouth. *International Journal of Research in Marketing*, 33(3), 656–673.
- Nordin, F., Raval, A., Möller, K., & Mohr, J. J. (2017). Network management in emergent high-tech business contexts: Critical capabilities and activities. *Industrial Marketing Management*. <https://doi.org/10.1016/j.indmarman.2017.09.024>
- O'Donnell, A. (2004). The nature of networking in small firms. *Qualitative Market Research: An International Journal*, 7(3), 206–217. <https://doi.org/10.1108/13522750410540218>
- O'Donnell, A. (2014). The Contribution of Networking to Small Firm Marketing. *Journal of Small Business Management*, 52(1), 164–187.

- O'Donnell, M. B., Bayer, J. B., Cascio, C. N., & Falk, E. B. (2017). Neural bases of recommendations differ according to social network structure. *Social Cognitive and Affective Neuroscience*, 12(1), 61–69.
- Oh, H., & Kilduff, M. (2008). The ripple effect of personality on social structure: self-monitoring origins of network brokerage. *The Journal of Applied Psychology*, 93(5), 1155–1164.
- Partanen, J., Chetty, S. K., & Rajala, A. (2014). Innovation Types and Network Relationships. *Entrepreneurship Theory and Practice*, 38(5), 1027–1055
- Pastor-Satorras, R. & Vespignani, A. (2002). Epidemic dynamics in finite size scale-free networks. *Physical Review E*, 65(3), 8–12.
- Payne, G. T., Moore, C. B., Griffis, S. E., & Autry, C. W. (2011). Multilevel Challenges and Opportunities in Social Capital Research. *Journal of Management*, 37(2), 491–520.
- Peluso, A. M., Bonezzi, A., De Angelis, M., & Rucker, D. D. (2017). Compensatory word of mouth: Advice as a device to restore control. *International Journal of Research in Marketing*, 34(2), 499–515.
- Pescher, C., & Spann, M. (2014). Relevance of actors in bridging positions for product-related information diffusion. *Journal of Business Research*, 67(8), 1630–1637.
- Porter, C. M., & Woo, S. E. (2015). Untangling the Networking Phenomenon: A Dynamic Psychological Perspective on How and Why People Network. *Journal of Management*, 41(5), 1477–1500.
- Raz, O., & Gloor, P. A. (2007). Size really matters—new insights for start-ups' survival. *Management Science*, 53(2), 169-177.
- Reagans, R., & McEvily, B. (2003). Network Structure and Knowledge Transfer: The Effects of Cohesion and Range. *Administrative Science Quarterly*, 48(2), 240.

- Reijonen, H., Hirvonen, S., Nagy, G., Laukkanen, T., & Gabrielsson, M. (2015). The impact of entrepreneurial orientation on B2B branding and business growth in emerging markets. *Industrial Marketing Management*, 51, 35–46.
- Reimer, T., & Benkenstein, M. (2016). Altruistic eWOM marketing: More than an alternative to monetary incentives. *Journal of Retailing and Consumer Services*, 31, 323–333. <https://doi.org/10.1016/j.jretconser.2016.04.003>
- Relling, M., Schnittka, O., Sattler, H., & Johnen, M. (2016). Each can help or hurt: Negative and positive word of mouth in social network brand communities. *International Journal of Research in Marketing*, 33(1), 42–58.
- Renko, M., Carsrud, A., & Brännback, M. (2009). The Effect of a Market Orientation, Entrepreneurial Orientation, and Technological Capability on Innovativeness: A Study of Young Biotechnology Ventures in the United States and in Scandinavia. *Journal of Small Business Management*, 47(3), 331–369.
- Resnick, S., Cheng, R., Brindley, C., & Foster, C. (2011). Aligning teaching and practice: a study of SME marketing. *Journal of Research in Marketing and Entrepreneurship*, 13(1), 37–46.
- Reynolds, P. L. (2002). The need for a new paradigm for small business marketing? - What's wrong with the Old One? *Journal of Research in Marketing and Entrepreneurship*, 4(3), 191–205.
- Risselada, H., Hans, R., Verhoef, P. C., & Bijmolt, T. H. A. (2015). Indicators of opinion leadership in customer networks: self-reports and degree centrality. *Marketing Letters*. <https://doi.org/10.1007/s11002-015-9369-7>
- Rocha, E. A. G. (2012). The Impact of the Business Environment on the Size of the Micro, Small and Medium Enterprise Sector; Preliminary Findings from a Cross-Country Comparison. *Procedia Economics and Finance*, 4(Icsmed), 335–349.

- Roelens, I., Baecke, P., & Benoit, D. F. (2016). Identifying influencers in a social network: The value of real referral data. *Decision Support Systems, 91*, 25–36.
- Robledo, S., & Zuluaga, G. A. O. (2012). Potencial de ingresos pasivos para los distribuidores en empresas de mercadeo multinivel con un plan de compensación binario. *Respuestas, 17*(2), 13-20.
- Robledo, S., Méndez, N. D. D., & Zuluaga, J. I. (2013). Difusión de productos a través de redes sociales: una revisión bibliográfica utilizando la teoría de grafos. *Respuestas, 18*(2), 28-42.
- Robledo, S., Osorio, G., & Lopez, C. (2014). Networking en pequeña empresa: una revisión bibliográfica utilizando la teoría de grafos. *Revista vínculos, 11*(2), 6-16.
- Rogers, E. M. (1995). *Diffusion of Innovations*. (The Free Press, Ed.) (4th edn.). London.
- Ryu, G., & Feick, L. (2007). A Penny for Your Thoughts: Referral Reward Programs and Referral Likelihood. *Journal of Marketing, 71*(1), 84–94.
- Sarasvathy, S. D. (2001). Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *Academy of Management Review, 26*(2), 243–263.
- Sarasvathy, S. D., & Dew, N. (2005). Entrepreneurial logics for a technology of foolishness. *Scandinavian Journal of Management, 21*(4), 385–406.
- Shaw, E. (1999). Networks and Their Relevance to the Entrepreneurial/Marketing Interface: A Review of the Evidence. *Journal of Research in Marketing and Entrepreneurship, 1*(1), 24–40.
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review, 25*(1), 217–226.
<https://doi.org/10.5465/AMR.2000.2791611>

- Schmitt, P., Skiera, B., & Van den Bulte, C. (2011). Referral Programs and Customer Value. *Journal of Marketing*, 75(1), 46–59. <https://doi.org/10.1509/jmkg.75.1.46>
- Semrau, T., & Werner, A. (2014). How Exactly Do Network Relationships Pay Off? The Effects of Network Size and Relationship Quality on Access to StartUp Resources. *Entrepreneurship Theory and Practice*, 38(3), 501–515. <https://doi.org/10.1111/etap.12011>
- Slotte-Kock, S., & Coviello, N. (2010). Entrepreneurship Research on Network Processes: A Review and Ways Forward. *Entrepreneurship Theory and Practice*, 34(1), 31–57.
- Smith, T., Coyle, J. R., Lightfoot, E., & Scott, A. (2007). Reconsidering Models of Influence: The Relationship between Consumer Social Networks and Word-of-Mouth Effectiveness. *Journal of Advertising Research*, 47(4), 387–397.
- Stam, W., Arzlanian, S., & Elfring, T. (2014). Social capital of entrepreneurs and small firm performance: A meta-analysis of contextual and methodological moderators. *Journal of Business Venturing*, 29(1), 152–173.
- Stephen, A. T., Zubcsek, P. P., & Goldenberg, J. (2016). Lower Connectivity Is Better: The Effects of Network Structure on Redundancy of Ideas and Customer Innovativeness in Interdependent Ideation Tasks. *JMR, Journal of Marketing Research*, 53(2), 263–279.
- Story, V., Hart, S., & O'Malley, L. (2009). Relational resources and competences for radical product innovation. *Journal of Marketing Management*, 25(5-6), 461–481.
- Stokes, D. (2000). Putting entrepreneurship into marketing: the processes of entrepreneurial marketing. *Journal of Research in Marketing and Entrepreneurship*, 2(1), 1–16. Retrieved from <http://www.emeraldinsight.com/journals.htm?articleid=1846386&show=abstract>
- Stokes, D., & Lomax, W. (2002). Taking control of word of mouth marketing: the case of an entrepreneurial hotelier. *Journal of Small Business and Enterprise Development*, 9(4), 349–357.

- Sprotles, G., & Kendall, E. (1986). A Methodology for Profiling Consumers' Decision-Making Styles. *Journal of Consumer Affairs*, 20(2), 267–279.
- Thornton, S. C., Henneberg, S. C., & Naudé, P. (2014). Conceptualizing and validating organizational networking as a second-order formative construct. *Industrial Marketing Management*, 43(6), 951–966.
- Torkkeli, L., Kuivalainen, O., Saarenketo, S., & Puumalainen, K. (2016). Network competence in Finnish SMEs: implications for growth. *Baltic Journal of Management*, 11(2), 207–230.
- Trusov, M., Michael, T., Bucklin, R. E., & Pauwels, K. H. (2009). Effects of Word-of-Mouth versus Traditional Marketing: Findings from an Internet Social Networking Site. *Journal of Marketing*, 73(5), 90–102.
- Uzuntarla, M., Yilmaz, E., Wagemakers, A., & Ozer, M. (2015). Vibrational resonance in a heterogeneous scale free network of neurons. *Communications in Nonlinear Science and Numerical Simulation*, 22(1-3), 367–374.
- Van den Bulte, C., & Joshi, Y. V. (2007). New Product Diffusion with Influentials and Imitators. *Marketing Science*, 26(3), 400–421.
- Van den Bulte, C., Bayer, E., Skiera, B., & Schmitt, P. (2017). How Customer Referral Programs Turn Social Capital into Economic Capital. *Journal of Marketing Research*, (15), jmr.14.0653. <https://doi.org/10.1509/jmr.14.0653>
- Verbraken, T., Goethals, F., Verbeke, W., & Baesens, B. (2014). Predicting online channel acceptance with social network data. *Decision Support Systems*, 63, 104–114.
- Vissa, B. (2012). Agency in Action: Entrepreneurs' Networking Style and Initiation of Economic Exchange. *Organization Science*, 23(2), 492–510.
- Watson, J. (2007). Modeling the relationship between networking and firm performance. *Journal of Business Venturing*, 22(6), 852–874.

- Watts, D. J. (2017). Should social science be more solution-oriented? *Nature Human Behaviour*, 1(1), 0015.
- Watts, D. J., & Dodds, P. S. (2007). Influentials, Networks, and Public Opinion Formation. *The Journal of Consumer Research*, 34(4), 441–458.
- Welter, F., Baker, T., Audretsch, D. B., & Gartner, W. B. (2017). Everyday Entrepreneurship-A Call for Entrepreneurship Research to Embrace Entrepreneurial Diversity. *Entrepreneurship Theory and Practice*, 41(3), 311–321.
- Wilensky, U. 1999. NetLogo. <http://ccl.northwestern.edu/netlogo/>. Center for Connected Learning and Computer-Based Modeling, Northwestern University. Evanston, IL.
- Whalen, P., Uslay, C., Pascal, V. J., Omura, G., McAuley, A., Kasouf, C. J., ... Deacon, J. (2016). Anatomy of competitive advantage: towards a contingency theory of entrepreneurial marketing. *Journal of Strategic Marketing*, 24(1), 5–19.
- Woehler, M.L. (2017). Gender and Networking: Building and Benefiting from High Status Ties in the Workplace (Doctoral dissertation). Retrieved from: https://uknowledge.uky.edu/cgi/viewcontent.cgi?referer=https://www.google.com.co/&httpsredir=1&article=1007&context=management_etds
- Wong, P. K., Ho, Y. P., & Autio, E. (2005). Entrepreneurship, Innovation and Economic Growth: Evidence from GEM data. *Small Business Economics*, 24(3), 335–350.
- Yang, M., & Gabrielsson, P. (2017). Entrepreneurial marketing of international high-tech business-to-business new ventures: A decision-making process perspective. *Industrial Marketing Management*, 64, 147–160.
- Yoo, C. W., Kim, Y. J., & Sanders, G. L. (2015). The impact of interactivity of electronic word of mouth systems and E-Quality on decision support in the context of the e-marketplace. *Information & Management*, 52(4), 496–505.

- You, Y., Vadakkepatt, G. G., & Joshi, A. M. (2015). A Meta-Analysis of Electronic Word-of-Mouth Elasticity. *Journal of Marketing*, 79(2), 19–39.
- Yun, J. J., & Park, K. (2016). How User Entrepreneurs Succeed: The Role of Entrepreneur's Caliber and Networking Ability in Korean User Entrepreneurship. *Science, Technology and Society*, 21(3), 391–409.
- Yu, X., Nguyen, B., & Chen, Y. (2016). Internet of things capability and alliance: Entrepreneurial orientation, market orientation and product and process innovation. *Internet Research*, 26(2), 402–434.
- Zacharakis, A. L., & Meyer, G. D. (2000). The potential of actuarial decision models. *Journal of Business Venturing*, 15(4), 323–346.
- Zarantonello, L., & Schmitt, B. H. (2013). The impact of event marketing on brand equity. *International Journal of Advertising*, 32(2), 255–280.
- Zhang, Y., Wang, Z., & Xia, C. (2010). Identifying Key Users for Targeted Marketing by Mining Online Social Network. In *2010 IEEE 24th International Conference on Advanced Information Networking and Applications Workshops* (pp. 644–649). Perth, Australia: IEEE.
- Zontanos, G., & Anderson, A. R. (2004). Relationships, marketing and small business: an exploration of links in theory and practice. *Qualitative Market Research: An International Journal*, 7(3), 228–236. <https://doi.org/10.1108/13522750410540236>
- Zott, C., & Huy, Q. N. (2007). How Entrepreneurs Use Symbolic Management to Acquire Resources. *Administrative Science Quarterly*, 52(1), 70–105.
- Zuluaga, M., Robledo, S., Osorio-Zuluaga, G. A., Yathe, L., Gonzalez, D., & Taborda, G. (2016). Metabolomics and pesticides: systematic literature review using graph theory for analysis of references. *Nova*, 14(25), 121-138.