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Nudging social online referrals: Evidence from a randomized field experiment

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NUDGING SOCIAL ONLINE REFERRALS: EVIDENCE FROM A RANDOMIZED FIELD EXPERIMENT

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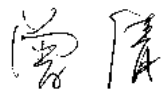
I hereby declare that this Doctor of Business Administration dissertation is my original work and it has been written by me in its entirety.
I have duly acknowledged all the sources of information which have been used in this dissertation.

This Doctor of Business Administration dissertation has also not been submitted for any degree in any university previously.



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Abstract

With the rise of social commerce platforms and customer engagement in online products and services, firms are focusing their attention on effective social online referral program to encourage customers' online referral behaviors to grow their customer base. Hence, how to influence customers to participate in online referral is a matter of the utmost importance to firms. However, little empirical research has examined the impact of online referral program on customers' online referral on social commerce platform. To close this research gap, this dissertation investigates the effectiveness of digital nudging for consumers' social online referral on social commerce platforms.

Working with a leading home appliances and consumer electronics company, we conducted a large-scale randomized online field experiment of digital nudging on a social commerce platform. Drawing upon the nudging theory and Persuasion Principle, this research uses a field experiment with 4,200 participants to examine the role of nudging persuasive framed messages using product scarcity and social proof heuristics in influencing consumers' social online referral.

The results of the experiment suggest that both persuasive framed messages with product scarcity and social proof heuristics positively impact customers' online referrals, comparing to the control group without nudging persuasive framed message. In terms of persuasive framed message, using low-level scarcity heuristic is more effective than social proof heuristic on online referral, while high-level scarcity heuristics is less effective than low-level scarcity heuristics. A higher level of scarcity might signal that an item has been taken by many people and its "status symbol" decreases, which dilutes the exclusivity and uniqueness of the item.

This research contributes to the literature on digital nudging and Persuasion Principle by providing evidence of the types of persuasion heuristics that are effective in influencing customers' online referral on social media platform.

Keywords: digital nudging, social online referral, social commerce, persuasion principle, scarcity, social proof, field experiment

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Dedication

To my loving Parents and family members for their love, support and encouragement throughout the years. This would not be possible, without their motivation and belief in me.

Chapter 1 Introduction

About 3.5 billion of the world's population use social media, spending about an average of two and a half hours daily on their smartphones for news, information, entertainment, learning, communication and shopping (Accenture, 2022). Consumers increasingly prefer to purchase online and often rely on recommendations and referrals from friends, family, colleagues and acquaintances they trust to reduce perceived risks (Prendergast, Ko & Yin, 2010) . Referrals are ranked as the highest source of trustworthiness. In a study by Nielsen (2013), it is found that 92 percent of consumers trust recommendations and referrals from friends and consumers are four times more likely to purchase when referred by a friend.

Driven by the rise of social media, social commerce platforms such as Facebook, Instagram, WeChat and TikTok have sprouted dramatically. In today's hyper-competitive e-commerce and social commerce market, online platforms are under immense pressure to find ways to drive user traffic to their platforms to achieve rapid and large-scale user growth. However, many e-commerce and social commerce platforms underestimate the importance of developing consumers' trust through social network which is the source of business value creation and competitive advantage in a platform business. One goal of social commerce platform is to strengthen the online communities through improved interactions and continual viral growth of positive network effects. Social network can help attract more users to the platform which in turn, attract more producers and opportunities for creating higher customer and

business value. Furthermore, a key difference between traditional business and platform business is that, in platform business, pull strategies designed to encourage viral growth are more important than the push strategies (such as advertising) used in traditional marketing. Empirical studies have demonstrated that pull marketing strategies through social online referrals are more effective than push strategies as consumers usually rely on referrals from others who already have experiences with that product or service (Cheema & Kaikati, 2010; Shi & Wojnicki, 2014) as advertising can't substitute for interpersonal influences (Dichter, 1966). Therefore, social commerce platforms should leverage the social network of existing customers to encourage viral growth to increase customer base.

Social online referral is distinct from online or electronic word-of-mouth (e-WOM) that refers to seller feedback and online product reviews which are usually posted publicly by customers. Social online referral is a direct and interactive communication between the existing customers and their friends and acquaintances (Shi, Hong, Wang & Pavlou, 2015). Research has shown that consumers' choices are significantly influenced by each other and that personal recommendations are the most credible and important resource for information (Chakravarty, Yong & Tridib, 2010). Referral customers tend to be more loyal, higher lifetime value and profitable as well, since they are acquired through referrals (Trusov, Bucklin & Pauwelset, 2009). Firms also recognize the importance of engaging social online referral marketing for viral growth. This is achieved by motivating and influencing existing customers through the

use of persuasive framed messages to create trust and to help spread awareness about the platform to other potential users outside of the platform (Huang, Aral, Hu & Brynjolfsson, 2020). In other words, utilizing the social network of existing customers to share the promotional campaign of the focal products or services to their friends and family members so as to influence them to act and benefit from the focal products or services. Thus, motivating customers to use social online referrals become paramount important and valuable to platform business.

Compared with traditional advertising, online referral is a cheaper way to achieve broader reach. The more people share, the less platforms spend on advertising and marketing. Given the emergence and use of social networks such as Facebook, Twitter, Instagram, LinkedIn, Pinterest, Weibo, WeChat and many others, information can easily be shared with people outside of the direct network with just a few clicks, contributing to viral marketing's success in faster dissemination of information to a broad audience. In order to get people to talk about the focal products or services, firms need to influence and persuade customers, presenting to customers that the offer and opportunity like a particularly good deal of practical value, be it monetarily and otherwise. When people perceive the deal as good, if they care, they will share. Personal recommendation is so powerful that it is imperative for firms to craft persuasive messages and contents to pick the right emotions to evoke. Social relationship between the customers and their friends is one of the important factors to consider. Users gain social capital when they share things to friends that are perceived

to be of good deal. Social capital refers to "those assets created and leveraged through relationships" (Nahapiet & Ghoshal, 1998). It affects what others think of them, leaving a good impression, making them look good to others and intrinsically rewarding. Moreover, providing monetary incentive can stimulate people to refer. For example, Huang, Chen, Hong and Wu (2018) empirically show the effectiveness of monetary incentives in motivating online referrals.

Social online referrals campaign in mobile social commerce could be in the form of creating and digitally nudging marketing programs or campaigns to existing consumers. Users are exposed to persuasive framed messages with or without financial incentives. A digital nudge frames the presentation of choice to make consumers more likely to pick the option that benefits them or others. Financial incentives or referral rewards can be shopping coupons, redeemable points, discounts, prizes, cash payments, free trials (Guo, 2012). Some successful online referral programs such as PayPal generate buzz by literally giving free money to users to invite their friends (Guo, 2012) and Uber run multiple referral programs letting users to give their friends the gift of discounted first rides and cash bonuses to drive referrals (Ridester, 2022).

Extend literature has examined the effectiveness of online social referrals and the underlying mechanisms. Shi and Wojnicki (2014) find that online referrals were significantly higher when extrinsic rewards were given versus intrinsic rewards. However, empirical studies also show that successful online referral programs do not have to use extrinsic rewards to pay users to spread word-of-mouth (Huang, Chen,

Hong & Wu, 2018). A plausible explanation why extrinsic rewards may not be effective is the reputational concerns and intrinsic referral motivations of the customers (Shi & Wojnicki, 2014). Online referral marketing campaigns using financial incentives need to be designed with care to ensure that there is no conflict between the senders and receivers as the financial benefits may not be split equally (Shi, Hong, Wang & Pavlou, 2015). It could be costly and may reduce existing customers' purchase intentions if the incentive systems are not designed and executed properly.

As an excellent alternative to financial incentives, social online referrals can harness people's social motives by using intrinsic motivations and their desire to look good to others. For users with strong social motivation, paying them may backfire and crowd out their intrinsic motivation, vanishing any interest and benefit in sharing for free. These are people who don't need to be paid to get motivated, but need to be motivated differently. One of the techniques and strategies commonly employed is the persuasion principle introduced by Cialdini (1993). The framed messages embedded with the persuasive heuristics of scarcity and social proof have proven to be effective in offline and online businesses (Koch & Benlian, 2015). Scarcity heuristic implies that due to people's desire for uniqueness, less accessible items are more desired by consumers because they are less readily available to them. Social proof heuristic implies that people rely and conform heavily on the actions, thoughts, and feelings of others, especially in times of uncertainty and assume that the actions of others indicate the correct behavior. Thus, online businesses can utilize these persuasive heuristics to take

advantage of peoples' need to build up social capital in order for them to spread the marketing promotion in social online referrals.

Although the effect and value of social referral programs has been discussed in the literature, little attention has been paid how social online referral should be implemented on social commerce platforms as well as the motives underlying those online referrals (Lam, Yeung, Lo & Cheng, 2019). It has been extensively documented that consumer behaviors are largely influenced by social interactions, but not many studies have investigated how firms should manage and strategically influence these interactions in the social commerce context. In particular, fewer studies have investigated what motivate users to participate in social commerce (Zhang, Lu, Gupta & Zhao, 2014). More importantly, the potential to adopt classical persuasive heuristics as promotional tactics to influence online referral behavior has not received enough attention and traditional promotion tactics may not be easily transferrable and work equally well in the online context (Koch & Benlian, 2015). Studies have shown that consumers' behavior in online world is different from offline due to the lack of experiential knowledge of the products or services (Degeratu, Rangaswamy & Wu, 2000). Despite the wide array of applications of persuasion heuristics, their effectiveness in online context for social online referrals has yet to proven (Slattery, Simpson & Utesheva, 2013). Thus, to close the gaps, it is important to examine the underlying motives for users to share, what persuasion heuristics are effective for online referral on social commerce platform.

This dissertation aims to investigate factors affecting the viral growth of social commerce platform via social online referrals in signing up new users to increase customer base in an online home appliances and consumer electronics store. We explore the design of mobile push notification as a digital nudging intervention tool with framing (wording) messages directed at motivating consumers to sign up. Drawing upon digital nudging theory and the persuasion principle of product scarcity and social proof heuristics (Cialdini, 1993), we examine the effectiveness of digital nudging in spreading the message and content to friends, family, colleagues and acquaintances, and consequently the referral outcomes.

In this research design, we consider digital nudging as framed promotional campaign messages. The design of the messages is motivated by persuasion heuristics representing different degrees of product scarcity and social proof. Specifically, this research aims to address the following research questions:

1. *What are the effects of product scarcity and social proof on nudging social online referrals?*

2. *Are product scarcity and social proof substitutable or complementary in nudging social online referrals?*

3. *How to design an effective targeting strategy in social online referrals?*

The research questions are analyzed via a large-scale randomized field experiment using a leading Chinese multinational home appliances and consumer electronics company's Tencent WeChat Mini Program to bring in new customers.

Participants in the field experiment are randomly nudged digitally via mobile push notifications send by the social commerce platform.

This research finds that the use of scarcity and social proof heuristics are effective in engaging existing consumers to share with their friends and family on social commerce platform. In addition, the combination of scarcity and social proof heuristics provide synergistic potential such that it creates a more significant positive effect on online referrals. Furthermore, our examination of the socio-economic and demographic attributes of gender, age, marital status, education levels and location of the users showed that all attributes have significant effects on low-level scarcity framed message, while the other attributes have mixed results with framed messages when making social online referrals.

This research contributes to the extant IS, behavioral science and marketing literature and management practice. It fills a research gap by providing empirical evidence in terms of social online referrals, social commerce and framed messaging based on nudge theory and persuasion principles of product scarcity and social proof to increase social online referrals in social commerce platforms. From a practical perspective, this research informs firms about the opportunities to create viral growth on social commerce platforms. This research provides valuable guidelines for social commerce platforms to generate awareness and achieve viral growth by targeting customers with product scarcity and social proof messages.

The remaining sections of this dissertation are organized as follows. Section two presents the literature review. Section three summarizes the theoretical framework and hypotheses development. Section four presents the methodology used in the research context and the design of the randomized field experiment. Section five presents the data, analysis and main findings of this research. Section six discusses the theoretical and managerial implications of the findings. Section seven discusses the limitations of this research and opportunities for further research. Finally, Section eight concludes this dissertation.

Chapter 2 Literature Review

This section reviews the literature on social commerce and social contagion, social online referral, nudging, framing and design mechanism and persuasion principle of product scarcity and social proof heuristics. The research hypotheses are developed by reviewing the literature of these potential drivers of referral propensity.

2.1 Social Commerce and Social Contagion

In recent years, social commerce has attracted scholars' and practitioners' attention to examine its impact on firms' online business. Social commerce is categorized as products or services ordered via social media platforms such as through Facebook Marketplace, Twitter, Instagram Checkout, Pinterest, YouTube, TikTok (Douyin), Taobao Live, Weibo, Xiaohongshu (Little Red Book), WeChat Mini Program, Line Shopping and many others. By 2025, social commerce is estimated to achieve USD1.2 trillion and will account for 16.7% of all e-commerce spending globally, growing at 26% compound annual growth rate (CAGR). The rapid growth is attributed to Generation Z and Millennials, who will account for 62% of the spending (Accenture, 2022).

The term "social commerce" was first coined by Yahoo in 2005 describing their online collaboration shopping tools and user rating (Saundage & Lee, 2011). It can be defined as the integration of social media with e-commerce – adding social media features to firms' e-commerce platform or adding e-commerce activities into their

social media sites enabled by a single platform – e-commerce in social media (Lam, Yeung, Lo & Cheng, 2019). Lai (2010) illustrates a triad relational model of social commerce (see Figure 2-1) which is the intersection of e-commerce (rewards of the whole system), social media (people) and Web 2.0 technologies (tools to integrate e-commerce into social media sites). Social commerce is therefore described as one form of e-commerce through the integration of business, community and technology to promote online shopping of products and services.

Figure 2-1 A triad relational model of socio-economic life on the web, adopted from Lai (2010)

In short, social commerce is e-commerce transaction opportunities and the application of viral marketing (i.e., word-of-mouth, people promoting the products or

services by telling others about it) in e-commerce enabled by social networks. Scholars have also defined the difference between e-commerce and social commerce and differentiate them by the firms' business objectives, customers' interaction and system integration (Huang & Benyoucef, 2013). In terms of customers' interaction, customers usually connect with e-commerce platforms individually while social commerce platforms involve online communities that provide connection socially to enhance interaction between firms and customers and customers and friends (Kim & Srivastava, 2007). Therefore, social commerce should be considered as a new way for firms to use in their sales and marketing strategies on social media. On social commerce platforms, unique contents are created by firms to drive authentic customers' engagement and action which subsequently allow customers to become co-creators and to have control of their shopping and social experiences (Lai, 2010).

A common feature of social commerce is the ability to facilitate social media interactions and user contributions to User Generated Content (UGC) (Zhang, Lu, Gupta & Zhao, 2014). Users are free to share information and contribute their knowledge and experiences to friends, even strangers on social media, thus creating word-of-mouth viral marketing. This is a fundamental shift in power from brand to people, treating consumers properly and correctly in social commerce entails taking full advantage of social commerce.

Prior studies have addressed the consequences of social commerce adoption and viral marketing at the individual level (Lam et al., 2019). Aral, Dellacrocas and Godes

(2013) investigate the relationship between social media and business transformation. Aral and Walker (2011) examine how firms can create word-of-mouth and social contagion by incorporating features into the design of their products and marketing campaigns partnering Facebook. Dou, Niculescu and Wu (2012) analyze how software firms optimize the network effects by simultaneously manipulating the embedded social media features with the right network seeding and pricing strategies. However, few studies have investigated at the individual level what motivate and drive people to participate in online referral on social commerce.

This research uses WeChat Mini Program, a popular social commerce platform in China, as the channel for social online referrals. By utilizing contents with persuasive framed messages and communities to facilitate online referral, this research adds to the literature on social online referrals for spreading awareness of the focal products or services on social commerce. Next, this research discusses how social online referral is typically being implemented on social commerce platforms.

2.2 Social Online Referral

Consumers' behavior (e.g., the adoption of a system or the purchase of a product or service) can be influenced by their online social networks (Aral & Walker, 2011). Referrals usually occur among offline friends and family members. With the proliferation of social media, online social influence or online referral becomes possible and easier. Social online referral is the practice of deliberately making use of

consumers' social networks to encourage them to forward a firm's marketing messages to their friends. Benefits of using social online referral for firms are its cost-effectiveness and reaching out to a broad audience (Koch & Benlian, 2015). Cost-effectiveness is resulted from consumers attributing higher credibility to messages from their peers and, therefore, likely to pay more attention and be influenced compared to direct messages from the firm.

Social online referral incentive systems are a critical consideration for firms that use monetary incentives or benefits to leverage positive word-of-mouth of existing consumers to attract new consumers. There are many studies on online referral incentive designs and their effectiveness. In the literature on online referrals, empirical studies tend to focus mainly on the proposers' behavior and reaction to referral incentives (Shi et al., 2015). In a study of "recommend-a-friend" promotions for mobile phone services, it is found that intrinsic motivation of satisfaction, tie strength, deal proneness and monetary incentive are effective mechanisms to increase the proposer's likelihood to generate online referrals (Wirtz & Chew, 2002). Biyalogorsky, Gerstener and Libai (2001) study the optimal mix of price and referral reward to motivate customers to generate referrals depending on how demanding customers are before they are willing to recommend. Three strategies are suggested: when customers are easy to delight, the optimal strategy is to lower the price and not to offer incentive rewards; in the intermediate level, a low-price and higher rewards should be offered; if the delight

threshold is high, no reward should be offered and no lowering of price as the firm should forsake the referral strategy.

On the other hand, many studies have proposed that using monetary incentive can backfire and resulting in adverse effect on the likelihood to generate online referrals. Shi and Wojnicki (2014) explain the ineffectiveness of using extrinsic rewards on online referrals to firms not understanding the reputational concerns and referral motivations of the consumers. Huang and al. (2018) show successful online referral programs do not have to use monetary incentives to pay users for online referrals. In their study, they examine the effectiveness of using digital nudging for users' social sharing of content on online platform. The effective nudging of framed messages grounded on social capital theory and peoples' motivation mechanism lead to increase in social online referrals. In spite of monetary incentives, people may not bother to share or generate online referral due to reasons such as online privacy, associated social risk in doing so and concerns of their social image.

The key unanswered questions are whether social ecommerce platforms can motivate social online referrals without financially rewarding existing customers and to what extent can digital nudging increase the rate of online referrals. This research contends that through digital nudging embedded persuasive framed messages are the key antecedents to social online referral performance. Next, this research discusses how digital nudging is implemented on social commerce platform.

2.3 Nudging

Nudge theory from the stream of behavioral science has been widely discussed and evaluated since the publishing of Thaler and Sunstein's book *Nudge: Improving decisions about Health, Wealth and Happiness* (Thaler & Sunstein, 2009). In their own words:

> "A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be cheap and easy to avoid. Nudges are not mandated. Putting fruit at eye level (hoping that people then choose fruit over unhealthy alternatives) counts as a nudge. Banning junk food does not" (Thaler & Sunstein, 2009, p.6).

The concept of nudges was built on the foundation of heuristics and inherent biases in cognitive decision making such as availability heuristics, loss aversion and framing (Thaler & Sunstein, 2009). Nudging is about giving people information and choices that influences their behavior into making better decisions and improving their lives. Nudging works by changing the decision environment, leading people towards the most beneficial outcomes for themselves and for others. The power to nudge can leads people to change behavior through a wide range of interventions - as simple as a subconscious cue, to achieve different outcomes. Intervention could also be through a

financial incentive, providing relevant information or blocking an inappropriate choice (Kosters & Van der Heijden, 2015).

Nudge theory is widely used by researchers and a wide array of applications can be found commonly in the public sector as a powerful tool in creating public policy interventions but is rarely used in the private sector. Nudges can be implemented in a wide range of forms to different contexts by a wide range of actors, from government nudging its' people (e.g., to lower rates of teenage pregnancy), business nudging its' customers (e.g., insurance companies to improve health outcomes to reduce insurance payout) and individuals nudging themselves (e.g., to quit smoking). For example, the U.K. government has demonstrated the efficacy of nudging by adding a line to a tax reminder prompting people to pay their taxes – by requesting people to sign up as organ donors while they pay for their car tax bring in extra donors yearly (Halpern, 2015).

Nudging theory has its fair share of criticism regarding whether nudges are effective and, if so, to what extent are nudges effective (Halpern, 2015). See, Valenti, Ho and Tan (2013) show when and how an implementation of a nudge to an attitudinal base can backfire and cause undesirable outcome; when the recipient is highly opposed to the message mismatching effects occur for both affective and cognitive attitudes.

Digital nudging, an extension of the concept of nudging to the digital environment, is a new phenomenon and has become of greater importance in social commerce as more consumers' interactions and decisions are done online (Huang et al.,

2018). Digital nudging incorporates the utilization of computer- user interface (UI) design elements to nudge and influence users towards a specific behavior or choice in a digital environment (Schneider, Weinmann & von Brockel, 2018). Research in digital nudging has been increasingly relevant as in the literature (Mirsch, Lehrer & Jung, 2017) and various experimental designs (Amipur & Benlian, 2015; Röthlisberger, 2020; Babić Rosario, Sotgiu, Valck & Bijmolt, 2016; Maslowska, Malthouse & Bernritter, 2017; Esposito, Hernandez, van Bavel & Vila, 2017; Huang, Chen, Hong & Wu, 2018).

In a laboratory experiment setting, by drawing upon the Stimuli-Organism-Response (S-O-R) paradigm and prospect theory, Amirpur and Benlian (2015) show that, when consumers are digitally nudged with purchase pressure cues (signal limited time or limited product availability), scarcity of limited time is effective in influencing consumers' online buying behaviors. Röthlisberger (2020) tests the effects of two digital nudges in an e-commerce florist store using decoy nudge and the social norms nudge; it showed the effectiveness of digital nudges by influencing user preference away from the cheapest variant of a flower bouquet on the e-commerce store. Babić Rosario et al. (2016) show that digitally nudging consumer ratings and reviews can influence consumers' purchase decisions. In another study on online reviews, it was found that product ratings between 4.2 and 4.5 stars increase the probability of purchase; the effect is nonlinear, where more positive ratings do not imply higher sales and that it is not always the case that larger numbers of reviews bring more positive outcomes (Maslowska et al., 2017). Esposito et al. (2017) conduct a laboratory experiment to

digitally nudge participants with three types of nudges (warning messages, style and information placement) to prevent the purchase of incompatible digital products online; the emotive warning messages and placing compatibility information on the checkout page were found to be effective. Huang et al. (2018) tests the effectiveness of digital nudging for social contagion on online platform content using website popups, integrating social capital theory and motivation mechanism to test four designs of nudging messages: simple request, monetary incentive, relational capital and cognitive capital. The study showed that nudging monetary incentive, relational capital and cognitive capital lead to increase in social sharing behavior whereas simple request decreases social sharing.

Although not conclusive, research has shown that digital nudging can be an effective and powerful intervention tool in e-commerce context. However, studies of digital nudging in the context of social online referrals on social commerce platform are relatively few and yet to be proven empirically. In addition, research on social online referrals has been examining customers' characteristics, motives and behaviors for sharing, the contents of the messages and the contexts. However, there is limited research on how to effectively digital nudge consumers for online referrals. Thus, this research adds to the literature on behavioral science and fills the void by extending our understanding on how to adopt digital nudging for social online referrals.

2.4 Framing and Design Mechanisms

Tversky and Kahneman (1986) posit that "people are affected by how the decisions are presented. People didn't choose things and they choose between descriptions of things. The decisions people made were driven by the way they were presented. People didn't simply know what they wanted; they took cue from their environment". This provides the support that framed messages and incentives could play an important role in an effective digital nudging**.** There are two key design elements for a successful online referral programs and these hinge on how the messages and incentives or benefits are framed: incentives design for the sender initiating the referral (and in some cases for senders and recipients) and the call-to-action framed messages to the sender (Jung, Bapna, Golden & Sun, 2016)**.**

A few studies have investigated the use and effectiveness of framing messages in the context of e-commerce (Huang, Burtch, Gu, Hong, Liang, Wang, Fu & Yang, 2019; Sun, Viswananthan & Zheleva, 2020) and in other related contexts (Fisher, Vandenbosch & Antia, 2008; Brunel & Nelson, 2000). Huang et al. (2019) develop a series of framed messages in online performance feedback interventions; through the alignment of the framed messages with user's characteristics to motivate users (sender to recipient) in the production of UGC drawing on social value orientations (SVO) theory. Their study concluded that cooperatively framed feedback is effective in motivating female to share information and the competitively framed feedback is effective in motivating male. Sun et al. (2020) investigate the design of framed

messages from the sender to the recipient to assess the impact on the recipient's purchase decisions and further referral behavior. Their study revealed that adding message and information about the sender's purchase status increases the likelihood of the recipient's purchase but no follow-up referrals.

Motivational based framed messages have been investigated in other contexts. Fisher et al. (2008) study the effectiveness of using altruistic framings versus egoistic framings at eliciting donations and found that altruistic framings are more effective when the framings mentioned the benefits to others rather than to the self. In a charity advertisement appeal experiment, females reported higher caring scores to help-other appeal (emphatic approach) and males to the help-self appeal (egoistic approach; Brunel & Nelson, 2000).

Academic interest in the design of incentives or benefits for social online referral program has attracted many interests and attentions (Bapna, Gupta, Jung & Sen, 2014; Hong, Pavlou, Shi & Wang, 2017; Sun, Viswanathan, Huang & Zheleva, 2019; Guo, 2012). The design of the incentive structure is to decide how the reward (usually financial incentive) is divided between the sender who makes the referral and the recipient who accepts it (Bapna et al., 2014). In most studies of behavioral science, the senders exhibit three types of behavior: generosity (altruistic); equality-seeking or selfishness (egoistic). Bapna et al. (2014) investigate how the manipulations of monetary reward shared between the sender and the recipient of the online referral to create social contagion: selfish reward (sender gets all), equal reward (split between

sender and recipient) and generous reward (recipient gets all). Their findings showed that generous prosocial reward (recipient gets all) increases the likelihood to create word-of-mouth than the selfish reward. In the same vein, Hong et al. (2017) integrate game theory and motivation theory to study the effects of social distance and monetary incentives on the performance of three different designs: rewarding the sender, rewarding both sender and recipient (split equally/ fair versus unequal/ unfair) and rewarding the recipient. The study showed that, for large social distance (weak dyadic relationship), equally splitting the reward results in best performance for online referral programs; for small social distance (strong dyadic relationship), equally splitting the reward has no significant impact on improving the referral performance. Sun et al. (2019) test the effectiveness of different incentive designs in creating social contagion: changing the shareability (shareable and non-shareable) and scarcity of promotion codes (one or two codes). The study concluded that targeting the one shareable code to the sender will increase the likelihood to pass the code to their acquaintance rather than purchase themselves. Guo (2012) provides a theoretical framework on the use of referral incentive to make optimal decisions in their online referral programs to influence word-of-mouth viral marketing based upon the Bass diffusion model; the findings suggested that offering referral incentives can be optimal in the initial phase of new product introduction and in general large market generates greater benefits.

Overall, prior studies reveal that the optimal design of online referral programs incorporate framed messages and incentives or benefits; targeting people with framed

message and financial incentive or benefit can increase the likelihood of creating social contagion in a large market. This research contributes to the literature on the design of framed messages and incentives or benefits and explore how it can stimulate social online referrals on social commerce platforms.

2.5 Persuasion Principle

Once the online platform has answered the questions of why and how (i.e., social online referral programs using digital nudging with framed message and incentive) to drive traffic to the platform, the next critical question is what type of persuasive framed message to use.

Psychologists have long discovered a number of "mental shortcuts or judgmental heuristics" that people use in making judgement every day. The advantage of such heuristics lies in its efficiency and economy, whereby reacting automatically to informative trigger feature, people save time, energy and mental capacity. Heuristics can be used to influence people what to believe or do. Thus, the ability to elicit people's emotional arousal and narrowed focus of information are compelling to firms to employ in their promotional campaigns.

Borrowing from social psychology, Cialdini's (1993) six core principles of persuasion are: reciprocity, social proof, authority, commitment and consistency, liking and scarcity. Reciprocity refers to the practice that individuals try to pay, in kind, what other individuals have provided. This rule of reciprocity creates a sense of future

obligation that make possible the development of closed relationship, transactions and exchanges that are beneficial to firms. Whoever makes the first move can influence the behavior of the other. The tactics often used is to give something first before asking for a return favor. Social proof refers to the tendency that individuals often check what people who are perceived similar to them are doing. Individuals decide what is correct and right in a given situation by observing what other people think is correct. In accordance to social evidence, individuals will make fewer errors by acting in accord what others are doing in uncertain situations. Authority refers to individuals usually act in compliance with the requests of an authority because people with authority usually possesses high levels of knowledge, expertise, wisdom and power and thereby such obedience constitutes the correct conduct. Commitment and consistency refer to individuals acting consistently with their past commitments. By acting consistently, individuals reduce the need to review relevant information if similar situations arise again. Liking refers to individuals usually say yes to those that they know and like. When individuals like someone or perceive similar to them, it builds rapport and increases the likelihood to accede to their requests. Finally, scarcity refers to individuals assign more value to opportunities when it is less available; they value what's in short supply. If an item is perceived as scarce, individuals are more likely to act on it for fear of missing out. Individuals tend to be attracted to scarce resources when they have to compete with others to get it. Cialdini (1991) states that although persuasion principle is effective and more powerful when used together, firms should take note that unethical,

high-pressure tactics or marketing tricks may work only in the short run, and the long-term effects are lack of trust which is the bedrock of any organization.

Although persuasion heuristics are often used in offline and online businesses, their effectiveness has rarely been studied and most of the studies on online usage are directed at consumer purchase intentions and little is known about the effectiveness of the persuasion heuristics in the context of social online referrals. This research suggests that two of the six principles (i.e., persuasion heuristics of product scarcity and social proof) are effective in social online referrals. The scarcity and social proof heuristics are selected since these heuristics are used widely, as well as offline (Fenko & Pruyn, 2017). For example, Amazon.com adopted both heuristics to generate awareness and attracting new potential customers (Koch & Benlian, 2015). Product scarcity and social proof heuristics have been shown as critical factors influencing product referral engagement (Pihlström & Brush, 2008; Sundaram, Mitra & Webster, 1998). Although these two persuasion heuristics are popular in practice, their effectiveness for online referrals on social commerce platform have yet to be empirically tested (Koch & Benlian, 2015).. Studies have examined social proof as a moderator which has a significant influence on the scarcity-perceived product value relationship (Koch & Benlian, 2015; van Herpen et al., 2009). However, from a practical perspective, our understanding of the effects of both heuristics on social commerce platforms is still very limited. To address this gap, this research examines the effectiveness of the

interactive effect of scarcity and social proof heuristics for online referrals on a social commerce platform.

In sum, the application of persuasion principle to this research context can provide an explanation why consumers make different decisions or choices under the influence of different persuasive messages (i.e., pressure cues or heuristics) when sharing information online. It is important to note that the effect of each persuasion heuristic, whether it is used individually or in combination, depends on the alignment between the consumers' preference and the context. We next discuss the persuasion principles of scarcity and social proof and the design of persuasion heuristics a social commerce platform should use to digitally nudge their existing customers to achieve social contagious in online referral promotion campaigns.

2.5.1 The Persuasion Principle of Scarcity

Scarcity principle implies that due to people's desire for uniqueness, less accessible items are more desired by consumers because they are less readily available to them (Cialdini, 1993; Lynn, 1991; Snyder, 1992). The more scarce an item is, the higher its value or desire (Lynn, 1991). Often used in an offline business, the scarcity heuristics have demonstrated its effectiveness and affected consumers' behaviors positively and perceived good product or service value (Jeong & Kwon, 2012; Kaptein & Eckles, 2012). The scarcity principle is also used frequently in the online businesses. For example, in travel and hospitality industry, consumers are often exposed to framed

messages like “only 10 seats left “, “only 10 rooms left” and “act now by pressing the button below”.

According to the commodity theory (Brock, 1968) which pertains to psychological effects of scarcity, if something is scarce, its value (or desirability) is enhanced because it can be possessed, is useful to its possessor, and can be transferred from one person to another (Lynn, 1991). Even before the internet era, marketers have assumed for a long time that scarcity enhances the perceived value of products and opportunities (Cialdini, 1993) and used product scarcity tactics in their traditional promotional campaigns. It is common for marketers to communicate the message to the consumers that they have to buy the product immediately otherwise they will not be able to buy it in the future (Wu, Lu, Wu & Fu, 2012).

The condition of scarcity occurs when the demand exceeds the supply for an object, thus creating a shortage for that object (Kemp & Bolle, 1999). Accordingly, this shortage of the object increases the perceived value of the object, as it implies exclusiveness and uniqueness, making it more desirable and valuable, thereby affecting consumer behaviors (van Herpen, Pieters & Zeelenberg, 2009; Wu et al., 2012). This implies that limited available objects or restricted objects are valued more than abundant objects, so “what is scare is good” (Dijksterhuis, Smith, van Baaren & Wigboldus, 2005). On the contrary, an object has less value to consumers if more consumers own it (Amaldoss & Jain, 2005). Fenko and Pruyn (2017) suggest that scarcity heuristic (“only 8 tickets left”) does not work in the online context to influence

consumer responses to purchase ticket online from the Dutch National Opera ticketing website. This might be explained by the fact that the scarcity message indicated to respondents that many people have already purchased the tickets, thus the status symbol decreases, and higher level of uniqueness can no longer be achieved. Cialdini (1993) advocates the scarcity principle of "less is best and loss is worst" with consumers assigning more value to an object or opportunity when they are less available. Lynn (1992) suggests that people's naïve economic theories may cause them to desire scarce products more than available products because people perceive that scarce product is expensive, high quality and good investments.

The scarcity principle is valid for two reasons: as an object is difficult to attain, it is typically more valuable and it can be a cue to its quality; as an object is difficult to attain, the consumers lose behavioral freedom (Cialdini, 1993). Further, according to the psychological reactance theory (Brehm, 1966), consumers hate losing out on things and also do not like to lose the freedom (i.e., restricting the opportunity to possess or experience an object signifies a loss of freedom) they already have; if individuals' behavioral freedom is reduced, it will motivate the individual to regain them. Therefore, when scarcity interferes with the individual access to an object, they will react against this interference by wanting and to possess the object more than before.

In addition to product value, consumers are attracted to scare products and will compete with others for them (Cialdini, 1993). The feeling of losing to others, fear of missing out (FOMO) are often exploited by firms as a promotional tactic to hasten

consumers purchasing decision. For example, property agents often call the prospect who has seen the property with news that another potential buyer is interested in the same property and will be returning the following day to negotiate terms. Similarly, Tversky and Kahneman (1986) illustrate in their prospect theory of loss aversion that under conditions of risk and uncertainty, the thought of losing something motivates people more than gaining something of equal value.

When consumers are exposed to the condition of scarcity, their ability to process information and behavioral outcome may be affected. Suri, Kohli and Monroe (2007) study how scarcity heuristics influence consumers' processing of price information and find that scarcity will induce arousal to impair an individual's ability to comprehend information and makes an individual more motivated to process the information. Hence, the persuasive effect of scarcity limits the individual's ability to process information and can be employed as "planned deception" to direct consumers to the expected outcome.

There are two types of scarcity: supply-based and demand-based. (Koch & Benlian, 2015). Supply-based scarcity (scarcity due to supply) refers to the deliberate supply limitations such as the "limited edition" of certain products (Verhallen & Robben, 1994). According to uniqueness theory, supply-based scarcity positively impacts consumers in their perception of the product as unique and exclusive, which motivates them to fulfill their needs by owning the product to be dissimilar from others (Snyder, 1992). The perceived value of a product increases when less people own it

and people are highly motivated to maintain a sense of specialness (Amaldoss & Jain, 2005).

On the other hand, demand-based scarcity (scarcity due to demand) refers to the deliberate "limited quantity" of certain products positively impacts consumer purchasing behavior due to high amounts of prior purchase with "only a few units remain" (Gierl & Huettl, 2010). Rather than affecting consumers perceived exclusiveness, demand-based scarcity uses social validation mechanism, for example, popularity, to lead consumers in inferring about good quality and high product value (Kardes, Posavac & Cronley, 2004). This phenomenon can be explained by the fact that people believe that other people's choices indicate the best products that they should not be missing out on (van Herpen et al., 2009). Different from the social proof principle that also uses the popularity heuristic (i.e., many people like it), the demand-based scarcity principle uses the fear of missing out due to limited product availability as many people have bought it. Van Herpen et al. (2009) demonstrate this demand-based scarcity concept by providing evidence on how consumers choose popular products which are less readily available (i.e., empty shelves) at the point of purchase. Gierl and Huettl (2010) show that the signal of scarcity resulting from supply-based scarcity (limited edition) is advantageous compared to signal of scarcity resulting from demand-based scarcity if the product is used for conspicuous consumption (e.g., branded goods). Contrary to this, if the product was not used for conspicuous

consumption, signals of scarcity resulting from demand-based scarcity would result in greater favorability for the product.

2.5.2 The Persuasion Principle of Social Proof

The social proof principle is a social influence tactic in which people reply on other people's actions to identify the appropriate behavior; people assume that the actions of others indicate the correct behavior (Cialdini, 1993). As a rule, people will generally make fewer errors if they act in accordance with social evidence than if they act opposing to it. Social proof is sometimes used in combination with scarcity or reciprocity (indebtedness) or other heuristics for synergistic potential. Often used in the offline environment, marketers use it to inform consumers on television commercials when a product is the "best-selling", "fastest-growing" or "100 million people can't be wrong" and they don't have to convince the consumers directly how good the product is; if many consumers think so, then it must be good as a proof. New restaurants employ a visible social proof by having a long waiting line outside the restaurants creating an impression that it must be good. In the online context, e-commerce websites use social proof heuristics to convince consumers of its trustworthiness by reducing their concerns about uncertainty. For example, taobao.com lists the number of people who bought the same item and ctrip.com provides ratings and comments of customers on their platforms.

The social proof principle implies that people rely and conform heavily on the actions, thoughts, and feelings of others, especially in times of uncertainty (Cialdini, 1993). Human beings are social creatures, crave interaction and the "need to belong" (Baumeister & Leary, 1955). People are influenced and persuaded by taking social cues from those around them, especially people that they liked. Simply put, when people don't know which decision or view is correct, they conform to the majority's decisions or views. Social proof heuristics are grounded on signaling theory and bandwagon effect. In the context of online businesses, signaling theory refers how two parties behave when they have different information; by displaying certain features on the website so that sellers can send information to buyers (Mavlanova, Benbunan-Fich & Koufaris, 2012). Bandwagon effect refers to the fact that another person is also consuming the commodity, the quantity of demand for the commodity increases; the psychology effect is conforming to the people they aspire to associate with (Leibenstein, 1950). Hence, the social proof principle holds for three reasons: under the condition of uncertainty about the correct conclusion, involves "the many" people that their actions must be correct, feasible and socially acceptable and people take cues from those who are perceived similar around them (peer-suasion). From what others wear, what they eat and what they do, what they say, social proof is an effective and powerful tool for persuasion. The social proof principle uses the popularity claim to create the perception that if other people claim the product or service is good, then it should be good (Cialdini, 1993).

Chapter 3 Theoretical Framework and Hypotheses Development

3.1 Theoretical Framework

The practice of viral marketing involves deliberately leveraging consumers' social networks by encouraging and inviting them to send a firm's messages (generate online referrals) to their friends, family, colleagues and acquaintances (Leskovec, Adamic & Huberman, 2007). In the context of this research, the three key elements to achieve viral growth for a firm's social commerce platform business include the senders (advocate), the value unit (which is the exchange of information that has value to the senders), and the recipients (friends).

The sender (first stage actor) shares by forwarding the message that they received from the firm which exposed them to the discount or promotion of the products and services (value unit). The sender's decision to share or not will depend on how they perceived the value unit, influenced and aroused by the promotion and opportunity, liked the product or service and motivated by the framed messages (Pihlström & Brush, 2008). The senders may also consider their social image whether their referral actions will enhance or impair their image (Leary & Kowalski, 1990). This sharing generates the cycle that will eventually bring in a new customer to the platform. The value unit is the discount, promotion of the products or services, the incentives of getting a good deal or opportunity and the message that the senders share with friends or family members.

The recipient(s) (second stage actor) got intrigued by the discount and promotion and visit the relevant link. This new customer may be enticed by the discount and promotion, shared by forwarding the message to their friends and start the cycle all over again. Thus, the recipient is now the sender. In short, to achieve viral growth, the platform manager needs to design rules and tools of viral campaigns that will kick-start the cycle. The goal is to design an ecosystem where the senders want to share the discount and promotion through their social network to a large number of recipients, leading many of those recipients to become customers.

The process begins with motivating the existing customers or users to spread the value unit. When the customers become senders and spread the value units, it may bring them fun, fulfillment and incentives. Digital nudging, a behavioral intervention tool taken from behavioral science to affect behavioral change, begins to find its way into e-commerce and social commerce applications. Nudging offers unique potential to develop novel ways of influencing consumers' behavior while requiring as little cognitive effort on their part. Nudging is about giving people information and choices that influences their behavior into making better decisions. Nudges work by altering the decision environment, steering people towards the most beneficial outcomes for themselves and for others.

The call-to-action is a framed message that nudges the customers to recognize the platform from which the value unit has been delivered and understands the opportunity to share with friends of the discount and promotion to acquire a good value

deal. In this research context, the value unit is the framed message with incentives and benefits.

As the value unit is created by the platform managers, they have control over the senders and eventually the recipients to nudge them in directions that will result in a call-to-action. The final element to achieve virality is the recipients. When a customer is nudged digitally by the mobile push notification to send a value unit to their friends, the recipient will respond if he or she finds the value unit relevant, useful, interesting, beneficial to them or others or otherwise valuable. If the recipient finds the value unit relevant, useful and beneficial to others, he or she will re-share the discount and opportunity, resulting in new interactions, virtuous cycle on the platform.

This research focuses on the first-stage actors when initiating online viral referrals. The first stage actors play a critical role in creating online viral referrals because the platform depends on their referral decisions to reach second stage actors. In addition, this research further examines whether the effectiveness of the framed message depends on the five control variables based on customers' socio-economic characteristics and demographics such as gender, age, education level, marital status and location. The theoretical framework is presented in Figure 3-1.

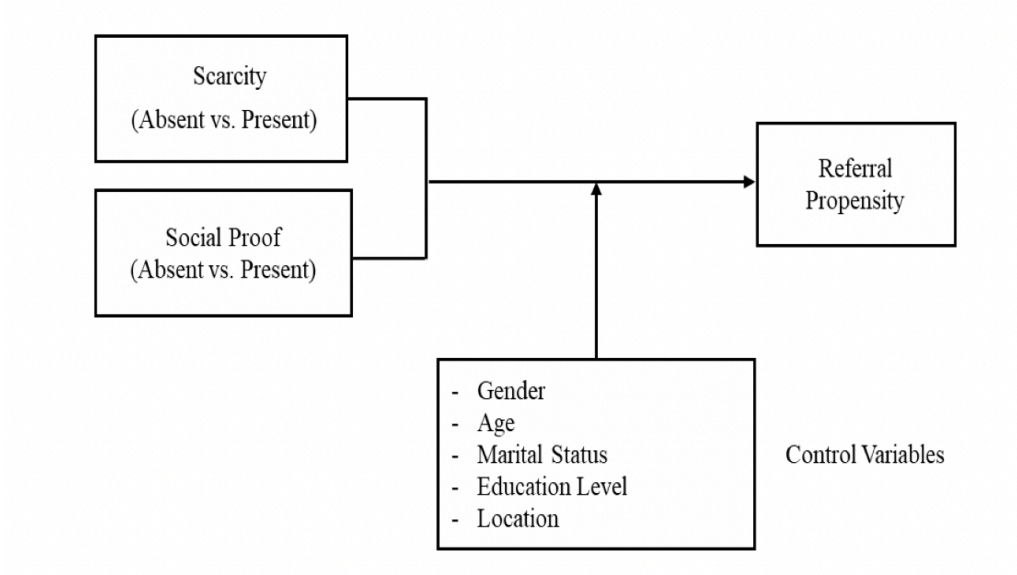

Figure 3-1 Theoretical framework

3.2 Hypotheses Development

Drawing upon the literature and the theoretical framework, a set of hypotheses are proposed and discussed as follows.

3.2.1 The Effect of Product Scarcity Heuristics on Referral Propensity

Scarcity heuristics boost social online referrals by making consumers feel like they are insiders as they capitalize on the social capital of knowing about the object or possessing it (Berger, 2013). People feel special, unique, and high status when they get something everyone else does not have. They not only like the products or services but will tell others about it, spreading word-of-mouth and online referrals.

Empirical studies in experiment setting have shown the effectiveness of scarcity heuristics in offline business, in-store context (Suri et al., 2007; Verhallen & Robben, 1994). Wu and Fu (2012) investigate the effects of product scarcity and consumers'

need for uniqueness on purchase intentions using questionnaire survey of purchasing handbags. The results suggested that perceived scarcity has a significant impact on assumed expensiveness based on Lynn's (1991) model of Scarcity-Expensiveness-Desirability (S-E-D); the higher the level of perceived scarcity, the higher the assumed expensiveness. Their study also suggests that perceived scarcity has a significant effect on perceived uniqueness based on Synder's (1992) uniqueness model. These studies suggest that both models can explain the phenomenon of scarcity heuristics; consumers possess scarcity products to satisfy their pursuit of distinctiveness as scarce products are perceived to be unique which ultimately influenced consumers' purchasing intention. Aggarwal et al. (2011) examine the effect of two types of scarcity messages (limited quantity and limited time) in an offline experiment setting about a fictitious watch sales event. Participants were presented with scarcity messages of "first 100 customers only" that the promotional offer is only available for a predefined quantity of watches, "for 6 days only" that the promotional offer is only available for a predefined duration and no scarcity message for the control group. The results conclude that limited quantity message is more effective than limited time message in influencing consumers' purchase intentions with consumer competition mediating the effect of scarcity heuristics on purchase intentions.

The persuasion principle of product scarcity is also used by practitioners in online marketing promotion. In online business context, it is common to implement product scarcity promotional tactics by informing and exposing consumers with framed

messages like “only 10 items left”, “limited release”, “while supplies last” or “limited time only” (Lynn, 1991). This “deliberate communication of limiting of a product availability” is embedded in the e-commerce and social commerce websites in their promotional campaigns to influence consumers’ behavior (Koch & Benlian, 2015). Akram, Hui, Khan, Yan and Akram (2018) examine the effect of scarcity and serendipity heuristics of online purchase on a Chinese social commerce platform. The study suggests that scarcity heuristics positively influenced online impulsive purchase as a form of fun and enjoyment when consumers received a scarcity message about a focal product.

Despite the extant research on scarcity effect and the usage of persuasion heuristics, to date, majority of studies on consumer behavior has been conducted in traditional offline settings, with notably few on online referral behavior (Suri et al., 2007). Cheema and Kaikati (2010) study online referral using scarcity heuristics and examine the role of a consumer’s need for distinctiveness in their willingness to participate in online WOM. The results suggest that scarcity-based supply hampers participation in online WOM since it is inconsistent with their desire for distinctiveness. In contrast, Koch and Benlian, (2015) show that demand-based scarcity has a positive effect on consumers’ referral propensity as consumers believe that they build more social capital when referring a scarcer offer.

Digitally nudging consumers with scarcity heuristics will influence them to recommend and refer to friends the focal products or services in a social commerce

environment. The optimal product scarcity heuristics to deploy are based upon the type of scarcity, the product category and the context in which it is used. Firms should adapt their deployment of persuasion strategies to the referral outcomes of the individual customers (Kaptein & Eckles, 2012). In general, product scarcity pressure cues can be classified into demand versus supply and time versus quantity (Gierl, Plantsch & Schweidler, 2008). In our experiment, supply-based, limited quantity scarcity dues are implemented. Because prior research has suggested that pressure cues of limited quantity positively influence consumers' behavior (Aggarwal et al., 2011), on the basis of the scarcity principle, the following hypothesis is formulated:

Hypothesis 1a: Framed message with product scarcity heuristics has a stronger positive effect on online referral than the message without product scarcity heuristics.

Hypothesis 1b: Framed message with high-level product scarcity heuristics has a stronger positive effect on online referral than the message with low-level product scarcity framed message.

3.2.2 The Effect of Social Proof Heuristics on Referral Propensity

Product scarcity heuristics encourage consumers' online referrals as there is a potential gain in social capital as the products or services offered are less accessible,

scarce, and hence more valuable. Social proof heuristics is another psychological and social phenomenon to encourage consumers' online referrals where consumers perceive the actions of others are the correct behaviors to conform (Talib & Saat, 2017) .

The use of social proof principle in e-commerce and social commerce has also shown to be effective in influencing consumers' behavior. When people shop online, they need "proof" to convince themselves that the sellers and products are legitimate and trustworthy; these "proofs" usually create a perception of high consumer demand for that particular product. The "deliberate communication of popularity or highly coveted by people" is embedded in the e-commerce and social commerce websites in their promotional campaigns to influence consumers' behavior (Koch & Benlian, 2015). In the context of online businesses, social proof is often used by marketers as a testimonial to manipulate and convey the perception that a product is a best seller or a very popular product by showing customers' positive reviews and ratings (Kaptein & Eckles, 2012). In an online experiment, participants who were informed that two-thirds of the bottles of a particular wine had been purchased are more likely to purchase that wine than if they were informed that only one-third had been sold (van Herpen et al., 2009). Different types of social proof techniques are employed, for example, "proofs" as in viewpoints of others can be in the implicit form of customers' reviews, ratings, likes, favorites, views, comments and recommendations to signal that the firm's products or services is of good reputation and trustworthy (Amblee & Bui, 2011). The number of "followers" on Instagram and the number of "likes" on Facebook signaled

people's perception about the sellers and products; the higher the number of followers and likes, the higher the trust of the sellers by the consumers, resulting in faster growth of followers, high engagement and click-through rates (Talib & Saat, 2017). Thus, the numbers of followers and likes serve as an effective and important source of social proof. If a consumer "like" the seller's page, they are likely to buy the product, also to recommend and make referrals to others. It is also common for e-commerce and social commerce platforms, such as Instagram Shop (InstaShop) to use reviews of celebrities, social media influencers to promote their products or services (Talib & Saat, 2017). Social proof by celebrities and influencers served as an endorsement and signal of good reputation that can influence consumers' purchase and referral intention. In an experiment, Talib and Saat (2017) examine the effect of different social proof techniques to sell mobile phone via Instagram. They find that high number of followers and positive recommendations from social community enhanced consumers' intention to buy from social commerce platforms but celebrity endorsement does not significantly affect consumers' purchase intention. Consumers may not be familiar with the celebrities or influencers and there may be a potential mismatch between the celebrities' image and product offering. Another popular social proof technique by social commerce platforms employs the use of implicit signal by displaying the logos or name of media publications (e.g., as seen in media) to communicate prior consumption behavior or having heard of their products or services. The more popular the media publication, the more credible to the consumers.

A trend in online businesses is using the social proof technique of communicating messages like “booked 100 times today”, “10 people are looking at this moment” for example, by booking.com (Fenko & Pruyn, 2017). In the case of booking.com, these explicit social proof signals of prior consumption behavior using “purchase counters” communicates the number of people has already purchased a particular product or service. Caution should be taken when using explicit social proof by the platform to manipulate the counter as setting a high number may encounter the issue of credibility of their claims. Jeong and Kwon (2012) conduct an experiment to evaluate the effectiveness of product popularity (e.g., “94% of consumers bought this product after viewing this site”) and found that consumer purchase intention was higher for those exposed to the claim.

In sum, social proof heuristics is effective because it mainly functions via two mechanisms: signaling effect and bandwagon effect. In the presence of uncertainty, consumers make inference about the quality of a particular product and trustworthiness of the sellers by the popular claims of other people that are similar to them and their desire to be associate with and to imitate other people’s behavior. This research contends that digitally nudging consumers with social proof heuristics will influence them to recommend and refer to friends the focal products or services in a social commerce environment. Based on all these observations, the following is hypothesized:

Hypothesis 2: Framed message with social proof heuristics has a stronger positive effect on online referral than the message without social proof heuristics.

3.2.3 The Interaction Effect of Scarcity and Social Proof Heuristics

Two persuasion heuristics – notably product scarcity and social proof are used in both offline and online contexts, but not much is known about their effectiveness in the social commerce context when they are used simultaneously. Product scarcity heuristics use persuasive message to tell consumers that they have to buy the products immediately otherwise they lose the opportunity to buy it in the future whereas social proof heuristics use persuasive message to tell consumers how popular the products are or high demand of the products. By combining both persuasion heuristics it may provide synergistic potential and the joint effect can amplify and reliably enhance online referrals. Consumers attribute to social proof heuristics that signal the popularity of the offer and thus give them the perception that the availability of the offer has been reduced; this is further amplified by scarcity heuristics displaying the limited number of offer available.

Wu and Lee (2016) investigate the purchase intentions of coffee mug from an online retailer either using the pressure cues of scarcity ("this product is a limited edition") and social proof ("75% of those who previously viewed the product purchased it'). The study found that when buying for oneself, scarcity heuristics are more effective

than social proof heuristics in influencing purchase decisions, whereas when buying for someone, social proof heuristics outperform scarcity heuristics. They have used the mediating effect of perceived product uniqueness to explain the "scarcity for me" effect and the mediating effect of perceived consumption risk to explain the "social proof for others" effect.

Koch and Benlian (2015) analyze the joint effect of scarcity and social proof heuristics in the context of a German start-up website Blinkist that provides summaries of non-friction books subscription service for online referrals. They found that scarcity heuristic affected online referral propensity if employed individually and social proof heuristic moderately amplified scarcity's effect on online referral. The study suggested that online businesses need to employ scarcity heuristic and whenever possible to incorporate social proof heuristic to increase online referrals in the promotional campaigns. In addition, online businesses need to understand peoples' need to have social capital (social currency) by giving them more consumers information and value in the design of promotional campaigns so that they can help to spread word-of-mouth for online referrals.

In sum, in a variety of marketing contexts, it is essential to understand the relative promotional power of scarcity against social proof. Having understood this would allow a firm to know what persuasive framed message to use for a particular promotional campaign. Existing literature suggests that promotion campaigns employing scarcity heuristics and social proof heuristics simultaneously could lead to

higher online referrals compared to when they are used individually. Thus, the following is hypothesized:

Hypothesis 3: Framed message with a combination of product scarcity and social proof heuristics has a stronger positive effect on online referral than the message with only product scarcity or social proof heuristics.

Chapter 4 Research Design

4.1 Background

The research site was a Tencent's WeChat Mini Program which is a social commerce platform of a leading multinational home appliances and consumer electronics company, Haier in China (https://www.haier.com.cn). I investigate the effectiveness of digitally nudged framed messages and product discount with the Haier's VIP plus card in generating online referrals of new customers through word-of-mouth viral marketing.

4.1.1 Description of Empirical Setting – Haier

The online randomized field experiment was conducted on Haier's social commerce platform. Home appliances and consumer electronics are experience goods with unknown quality and with difficulty in assessing before buying. Thus, it is suitable using field experiment to examine the effects on social online referrals. Haier is of particular interest as it is a well-known company domestically and internationally serving a large addressable market. Haier headquartered in Shandong province was ranked as the world's number one home appliances and consumer electronics manufacturer with a revenue of USD32.1 billion and the second largest Chinese manufacturer is Midea, headquartered in Guangdong province with USD17.4 billion in revenue (Statista, 2022a). Haier designs, manufactures, sales and marketing of home appliances and consumer electronics includes refrigerators, cookers, ovens,

microwaves, blenders, washing machines, dishwashers, dryers, coffee machines, food processors, vacuum cleaners, air conditioners, water heaters, televisions, dehumidifiers, mobile phone, computers, and many others. Established in the 1980s', Haier's iconic logo of two children is synonymous with quality products and has moved beyond the low-price segment to innovation and high-technology. With the advent of smart home and Internet of Things (IOT), Haier developed the SmartHQ app to connect appliances to smartphone or smart home devices to receive alerts and manage settings (www.haier.com.cn).

In 2020, the market size of China's home appliances and consumer electronics is USD235 billion and is expected to grow due to increased individual income level and urbanization (Statista, 2022b). However, with the recent outbreak of COVID-19 pandemic, online sales become an important sales strategy for home appliances and consumer electronics manufactures. In 2020, the online retail sales of home appliances and electronics consumers is on parity with offline retail sales and has increased 14.8 percent compared to 2019 (Statista, 2022c). The home appliances and consumer electronics industry are undergoing a major digital transformation with many manufacturers adopting and increasing their brand presence online. Indeed, COVID-19 has accelerated e-commerce and social commerce rapidly, especially in China, where social commerce is also helping brands to convert engagement into sales.

For the past years, online shopping of home appliances and consumer electronics has become an integral part of life in China as consumers show strong

preference to shop these products online; no longer feel the need to "see, touch and feel" before buying and the convenience of delivering bulky products directly to their doorsteps. Demand for online sales of home appliances and consumer electronics will continue to grow unabatedly with urbanization, the rise of a higher middle-income group, opportunities to reach out to second- and third-tier Chinese cities, ubiquitous smartphones, and savvy younger generation. It is imperative for Haier to grow continuously into a leading online home appliances and consumer electronics manufacturer in China.

4.1.2 WeChat Mini Program

According to a report by Statista, in the third quarter of 2020, the universally adopted messaging and social media app WeChat had registered 1.2 billion of monthly active users, ranking fifth globally in terms of leading social network platform (Lai Lin Thomala, 2020). WeChat Mini Programs are "sub-application" within the ecosystem of WeChat, allowing e-commerce retailers to leverage the social networking of WeChat with typical applications including e-commerce, task management, coupons and etc. WeChat launched the Mini Program in 2017 and in 2020 captured RMB800 billion (USD124 billion) of sales via its Mini Program and was positioned as the fourth-largest e-commerce platform in China (eMarketer, 2020).

Firms can create Mini Programs within the WeChat system using JavaScript and a proprietary API. Users install the Mini Programs within their WeChat app. It has

demonstrated its value in marketing through precise user targeting and have a number of advantages over native apps. Before Tencent developed the WeChat mini-program, firms sending push notifications from their own official WeChat Service Account to users could not link to their products (in order to convert from content to e-commerce) because articles sent on their accounts can't contain hyperlinks. Mini Programs have similar functions as the native apps, but they are web-based, hosted within WeChat app and work on any smartphone. Native apps require both iOS and Android versions, but Mini Programs do not. It allows easy access by scanning a QR code or searching for their name on WeChat, or by clicking a link shared by friends. The speed of Mini Programs run faster than native apps and no download or installation is required. It takes less time to develop (lower development cost), is flexible (easier to develop programs) and has better UI (easier to navigate). Mini Programs are also useful for promoting offline to online activities. For example, a furniture marketplace platform developed a Mini Program to aggregate the products of different furniture retailers and salespersons can use it at the retail shops displaying to the customers digital brochures of 2D, 3D pictures, videos and VR/ARs of the furniture products by scanning WeChat's QR codes that will open the Mini Program on the customer's smartphone which eventually leads to referral to friends or purchase of merchandise online directly from their e-commerce sites. At the same time, Mini Programs' interactive features can drive sales campaigns with promotions and coupons. Since WeChat is ubiquitous and had a large user base in China, plus the ease of creating Mini Program, it makes sense for

Haier to develop Mini Programs for their social commerce activities. In addition, Haier does not have to face with the real conundrum to develop an IOS and/or Android version apps that usually trouble platform developers outside of China.

4.2 Method

The main research used a randomized online field experiment, between subjects experiment. Participants were active users of Haier's Mini Program to ensure the effectiveness of the experiment.

In this research context, the digital nudging tool is in the form of a mobile push notification which automatically send from the Mini Program to the customers' smartphone resulting in a call-to-action. The call-to-action is a framed message that nudges the customer to recognize the platform from which the value unit has been delivered and understands the opportunity to share with friends of the discount and promotion to acquire a good value deal. The next step towards online virality is the design of the spreadable value unit which is the exchange of information from the sender to the recipient - the framed message with incentives and benefits. In the analysis of the effectiveness of the value unit, this research analyzes and manipulates six different types of persuasive framed messages with different incentives targeting randomly at existing customers.

4.2.1 Experimental Design

To test the proposed hypotheses, this research conducted a randomized online field experiment. The focus of the online field experiment is to test different landing pages regarding the participants' referral effectiveness. Hence, the experiment was conducted on a separate WeChat landing page, and it was not publicly announced in their official website or WeChat account. To test the online referral effectiveness, participants were shown on the landing page that they were offered a special promotion and opportunity to get a Haier's VIP Plus card where they could obtain home appliances and consumer electronics at no cost; a saving of RMB3500. In addition to the special promotion message at the top of the landing page, the campaign landing page added the persuasive framed message which is the manipulations, alternated in terms of scarcity (presence versus absence) and social proof (presence versus absence) levels at the center of the landing page. Most importantly, a bar displaying a "Share gifts with friends" message for participants to forward and make referrals to friends, family members, colleagues and acquaintances. Lastly, the landing page showed some home appliances and consumer electronics that participants could exchange for products at no costs and other benefits that come with the VIP Plus card at the bottom half of the landing page. An example of a landing page is shown in Figure 4-1.

Figure 4-1 Screenshot of a main campaign landing page of Haier's Mini Program

4.2.2 Manipulation

To set up the online randomized field experiment, this research designed, created, and employed a 2 (no social proof and with social proof message) x 3 (no

scarcity, low scarcity and high scarcity message) between subjects, full-factorial experiment design, resulting in 6 different mobile push notification versions of the persuasive framed message on their Mini Program. This is the key manipulation of the experimental design. Using a between-subject design will prevent practice and fatigue effects that can jeopardize within-subjects designs, as well as reduce the chances of participants figuring out the aims of the experiment and that the results will not be biased (Amirpur & Benlian, 2015). The manipulation for social proof was implemented as an implicit variant (i.e., presence versus absence), displaying a "90% people in your city have taken the offer" bar for the presence of social proof message. Following the method adopted by Jeong and Kwon (2012), using social proof manipulation of "94% of consumers bought this product after viewing this site". The manipulation for scarcity was implemented as three variants (i.e., presence of either one of the two variants versus absence), displaying either a "998 items left" for low scarcity or a "198 items left" for high scarcity message. To control for confounding effects, the six manipulations used on the main landing page used the same design; wording arrangement, text size, font, picture, color except for the scarcity and social proof messages.

4.3 Procedure

The steps taken in the experiment are as follows: First, experimental treatments were digitally nudged with a short message: "Do you know how to get an extra

RMB3500 pocket money? Plus RMB 0 exchange, exclusive discount?" to participants' smartphone via a mobile push notification to the users' Short Message Service (SMS; see Figure 4-2). All participants were notified of an SMS with the same message at this stage but with a different URL. Six URLs were created for each of the experiment design, keeping the same design and text to control for confounding effect.

[Haier] Do you know how to get an extra RMB3500 pocket money? Plus RMB 0 exchange, exclusive discount. Details zj9.co/U/B2xwM?p=F1LVvl Unsubscribe reply T

Figure 4-2 Screenshot of SMS with six different URLs used in Haier's field experiment

Second, once the participants' interests were aroused, they clicked the URL of the SMS and prompted in another window if they would like to "Open this page in 'WeChat'?" If the participants accepted to "Open", they were forwarded to the main campaign landing page within Haier's WeChat Mini Program (see Figure 4-3). If the participants rejected with "Cancel", it will be shown a blank page.


9:41
立即开通
升级Plus会员全年可省约 3500 元
Haier
分享好友共享好礼
专享礼品，开卡0元兑
0元兑换区，任选一款
单次家电深度清洗
¥199
兑换价 ¥0
立刻兑换
海尔吸尘器HT-C216
¥199
兑换价 ¥0
立刻兑换
纤醒洗衣液2KG/瓶*6
¥150
兑换价 ¥0
立刻兑换
海尔电烤箱K-10M2B
¥199
兑换价 ¥0
立刻兑换
智能水杯TWD2121
¥149
兑换价 ¥0
立刻兑换
更多权益
PLUS价商品
超值专享折扣
品类优惠券
约800元/月额度
专属客服
优先响应
清洗优惠
健康洁净
分享好友共享好礼
9:41
立即开通
升级Plus会员全年可省约 3500 元
Haier
您所在城市已有 90% 人开通
即将售罄
分享好友共享好礼
专享礼品，开卡0元兑
0元兑换区，任选一款
单次家电深度清洗
¥199
兑换价 ¥0
立刻兑换
海尔吸尘器HT-C216
¥199
兑换价 ¥0
立刻兑换
纤醒洗衣液2KG/瓶*6
¥150
兑换价 ¥0
立刻兑换
海尔电烤箱K-10M2B
¥199
兑换价 ¥0
立刻兑换
智能水杯TWD2121
¥149
兑换价 ¥0
立刻兑换
更多权益
PLUS价商品
超值专享折扣
品类优惠券
约800元/月额度
专属客服
优先响应
清洗优惠
健康洁净
分享好友共享好礼
9:41
立即开通
升级Plus会员全年可省约 3500 元
Haier
最后 998 个名额
分享好友共享好礼
专享礼品，开卡0元兑
0元兑换区，任选一款
单次家电深度清洗
¥199
兑换价 ¥0
立刻兑换
海尔吸尘器HT-C216
¥199
兑换价 ¥0
立刻兑换
纤醒洗衣液2KG/瓶*6
¥150
兑换价 ¥0
立刻兑换
海尔电烤箱K-10M2B
¥199
兑换价 ¥0
立刻兑换
智能水杯TWD2121
¥149
兑换价 ¥0
立刻兑换
更多权益
PLUS价商品
超值专享折扣
品类优惠券
约800元/月额度
专属客服
优先响应
清洗优惠
健康洁净
分享好友共享好礼

Figure 4-3 Screenshots of the six landing pages of Haier's Mini Program in the field experiment

Note: The screenshots in the upper half (from left to right) show the persuasive framed messages in the absence of scarcity and social proof, the absence of scarcity and

presence of social proof and the presence of low scarcity and absence of social proof manipulation. The screenshots in the bottom half (from left to right) show the persuasive framed messages in the presence of low scarcity and social proof, the presence of high scarcity and absence of social proof and the presence of high scarcity and social proof manipulation.

The experimental treatments were manipulated to test users' sharing of the Mini Program to friends, colleagues and family members being digitally nudged by the framed message and there is no limit to the number of times or referrals that each user can share. In the last step, users initiated the sharing action by referring to their friends and acquaintances by tapping on the icon "Share gifts with friends" in the Mini Program.

4.4 Data Collection

A total of 4,200 participants were randomly selected from the data set of Haier who were registered customers for this research. Of the 4,200 participants, 2,082 were females and 2,118 males. 50.5% of the participants in the experiment were male which is comparable to the sex ratio of total population in China in 2020 with approximately 104.8 males to 100 female (Statista, 2020d). 1,967 of the participants were single and 2,233 (53.1%) participants were married. The age of the participants ranged from 23 to 62 years (i.e., born in the 1960s to 1990s): 206 (4.9%) of the participants were born in the 1960s, 1,659 (39.5%) of the participants were born in the 1970s, 1,815 (43.2%) of the participants were born in the 1980s and 905 (12.4%) of the participants were born in the 1990s. The education system of China classified students with a non-degree

Zhuanke higher professional education and above as higher education (World Education Services, 2019). Most participants (91%) completed higher education: 1,900 (45.3%) had a non-degree Zhuanke higher professional education, 1806 (43%) had a bachelor's degree and 113 (2.7%) had a master's and above degree. Of the 9% with lower education: 122 (2.9%) had a junior high school education and 258 (6.1%) had a senior high school education. It is not surprise to find a high percentage of the participants with higher professional education, as those with lower education may not like to shop online in using smartphones. Although the Chinese government does not publish an official Chinese city tier system, it is classified by various media publications as consisting of 6 tiers (Wikipedia, 2022). There are 4 tier-1 cities (Beijing, Shanghai, Guangzhou, and Shenzhen) and 15 new tier-1 cities. All participants were from all over Mainland China covering over 100 cities. 2000 (47.6%) of the participants were residing in tier-1 and new tier-1 cities: 791 (18.8%) in tier-1 and 1209 (28.8%) in new tier-1 cities. The remaining 2200 participants (52.4%) were residing in tier-2 to tier-6 cities. Hence, the experimental sample used was concluded as a good representative and subset of the total population (China Statistical Yearbook 2019, 2022.) Table 4-1 depicts the socio-economics characteristics and demographic attributes of the samples.

Table 4-1 Socio-economic characteristics and Demographics (n=4,200)

No	Characteristics	Category	Frequency	%
1	Gender	Female	2,082	49.5
		Male	2,118	50.5
2	Marital Status	Single	1,967	46.9
		Married	2,233	53.1
3	Age	Born in 1960s	206	4.9
		1970s	1,659	39.5
		1980s	1,815	43.2
		1990s	905	12.4
4	Education Level	Junior High School	122	2.9
		Senior High School	258	6.1
		Zhuanke	1,900	45.3
		Bachelors	1,806	43.0
		Masters' & above	113	2.7
5	Location	Tier-1 cities	791	18.8
		New Tier-1 cities	1,209	28.8
		Tier-2 to Tier-6	2,200	52.4

The 4,200 participants were then randomly assigned to 6 experimental groups, resulting in a total of 700 participants in each group (see Figure 4-4). The six groups were assigned and they were nudged with different persuasive framed messages to share with their friends and acquaintances as followed: Group 1 is the control group where participants were nudged and exposed in the absence of scarcity and social proof persuasive framed messages, Group 2 is the treatment group where participants were exposed in the absence of scarcity and presence of social proof (90% people in your

city have taken the offer) messages, Group 3 participants were exposed in the presence of low scarcity (998 items left) and absence of social proof messages, Group 4 participants were exposed in the presence of low scarcity (998 items left) and social proof (90% people in your city have taken the offer) message, Group 5 participants were exposed in the presence of high scarcity (198 items left) and absence of social proof messages and Group 6 participants were exposed in the presence of high scarcity (198 items left) and social proof (90% people in your city have taken the offer) messages.

Group 1	Group 3	Group 5
Absence of Scarcity and Social Proof messages	Presence of Low Scarcity (998 items left) and absence of Social Proof messages	Presence of High Scarcity (198 items left) and absence of Social Proof messages
Group 2	**Group 4**	**Group 6**
Absence of Scarcity and presence of Social Proof (90% people have taken) messages	Presence of Low Scarcity (998 items left) and presence of Social Proof (90% people have taken) messages	Presence of High Scarcity (198 items left) and presence of Social Proof (90% people have taken) messages

Figure 4-4 The six experimental groups

Notes: The manipulative messages shown to the participants are in Chinese

An assigned participant, depending on the experimental treatment group to which they were randomly assigned, will receive only one of the six framed messages. An algorithm was developed to automatically nudge the framed message to the assigned participants. All participants were digitally nudged with the framed message on a Friday, in September 2020 at 08:00 hours, Beijing time (+8 GMT) for the 24 hours' duration of the study. Upon successful referrals, i.e., once the user shared the Mini

Program to refer to their friends and acquaintances, it was recorded and tracked by Haier.

Haier captured the data on which group the participants were randomized to, whether the participants clicked the URL of the SMS, the landing page that the participants were shown and whether the participants clicked the share icon on the landing page to share. These data were combined to examine the effectiveness of the manipulative framed messages on the treatment groups in digitally nudging participants for online social referrals.

4.5 Covariates

Empirical research suggests that the demographic variables such as gender, age, income, ethnicity, marital status, education qualification, experience and geographical boundaries can have an impact on online consumer behavior (Ansari & Farooqi, 2017). Studies have shown that online buyers are usually male, younger, single, more educated and have higher disposable income (Ratchford et al., 2001; Sethi & Sethi, 2018). It is not surprising as younger males usually spend more time online than females and thus more likely to purchase online (Shavitt, Lowrey & Haefner, 1998). Generational Y or Millennials are willing to spend online as they are more tech-savvy, thus perceived lower risk and anxiety due to their familiarity with the skills and procedures of online purchase (Nawi, Al Namun, Hamsani, Muhayiddin, 2019). However, some studies have found contradictory and no conclusive results on the impact of demographic

variables on online shopping (Hashim, Ghani & Said, 2009). For example, age does not influence consumers' attitude and no evidence that education level is an important determinant of online shopping behavior. To date, empirical research on the impact of demographic variables on social online referrals is limited.

The growth of the Chinese economy and the increasing power of Chinese consumers to purchase has made it imperative for firms to understand and meet consumers' needs. China's consumer behavior online varies greatly by socio-economic characteristics and demographics. It is critical to gain insights into Chinese consumers' behavior online to understand the underlying persuasive mechanism that influence them to share and generate online referrals. The question "who are the Chinese online consumers that generate online referrals on social commerce platform" needs to be answered.

Researchers in China have examined the relationship between Chinese consumers' socio-economic characteristics and demographics, their Internet usage and online shopping behavior. Wu, Cai and Liu (2011) argue that male customers who have higher level of education and higher household income are more likely to purchase online, while old married consumers are less likely to purchase online. The study also suggests that being a member of the Chinese Communist Party will increase the probability of becoming an online purchaser which may be explained by their ability to access to the limited resource (e.g., Internet usage) in the Chinese society. However, limited research has focused on Chinese consumers' behavior in social online referrals

and this research contributes to the literature and practical implications on Chinese online consumers' socio-economic characteristics and demographics related to their social online referral behavior.

Chapter 5 Results

5.1 Descriptive Analysis

From the 4200 participants, the total number of clicks from the SMS is 1148. Out of these clicks, the total number of referrals (sharing) is 321. The average sharing rate across the six groups is 27.96%, which is higher than the organic sharing rate of the control Group 1 (absence of scarcity and social proof) at 16.47%. The highest sharing rate is Group 3 which is the presence of low scarcity (998 items left) and absence of social proof (90% of people in your city have taken the offer) at 40.90%. The second highest sharing rate is Group 5 which is the presence of high scarcity (198 items) and absence of social proof (90% of people in your city have taken the offer) at 29.33%. The third highest sharing rate is Group 6 which is presence of high scarcity (198 items left) and presence of social proof (90% of people in your city have taken the offer) at 28.30%. In addition, the treatment with the lowest sharing is Group 4 which is the presence of low scarcity (998 items) and presence of social proof (90% of people in your city have taken the offer) at 25.00%, and that is still about 1.52 times higher than the sharing rate of the control Group 1. Table 5-1 shows the descriptive statistics for the social online referrals data per group.

Table 5-1 Descriptive Statistics

Group	**Click**	**Share after Click**	**Sharing Rate**
Control Group 1	170	28	16.47%
Group 2 (Social Proof)	223	61	27.35%
Group 3 (Low Scarcity)	176	72	40.90%
Group 4 (Low Scarcity and Social Proof)	164	41	25.00%
Group 5 (High Scarcity)	150	44	29.33%
Group 6 (High Scarcity and Social Proof)	265	75	28.30%
Total	1148	321	27.96%

Visualization of the sharing rates across the 6 experimental groups is shown in Figure 5-1. As shown below, Group 3 which is in the presence of low scarcity (998 items) and social proof (90% of people in your city have taken the offer) is the most effective in terms of generating social online referrals, followed by Group 5 and Group 6. It also shows that all treatment groups have higher sharing rates than the control Group 1.

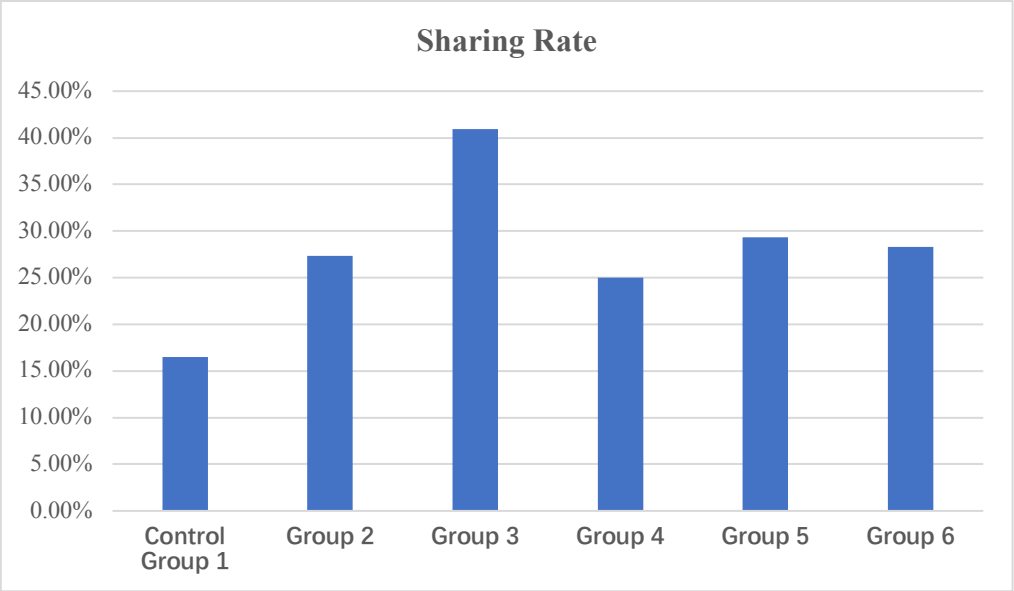

Figure 5-1 Sharing rates across six groups

5.2 Regression Analysis

To examine the effect of different information on referral behavior after clicking, logit regression analysis was employed. Specially, the detailed specification is shown in Equation (1):

$$\textit{Logit (Referral or not)} = \beta_0 + \beta_1 Group2_i + \beta_2 Group3_i + \beta_3 Group4_i + \beta_4 Group5_i + \beta_5 Group6_i + Controls_i + \varepsilon_i \quad (1)$$

In Equation (1), $GroupK_i$ (K=1,…,6) is a dummy variable indicating whether individual *i* belongs to treatment group *K*. $Group1_i$ is the omitted baseline group; thus, the coefficient before $GroupK_i$ measures the effect of the information in treatment group *K* on individuals' referral behaviors. Five demographic variables were controlled for in this research. Gender was dummy coded, with 1 representing males and 0

representing females. Marital status was dummy coded, with 1 representing married and 0 representing single. Age was dummy coded, with 1 for participants born in the 1980s and 1990s and 0 for those born in the 1960s and 1970s. Education was dummy coded, with 1 for participants having higher education (i.e., a non-degree Zhuanke higher professional education, bachelor's degree, master's degree and above) and 0 for participants having lower education (i.e., junior high school education and senior high school education). Location was dummy coded, with 1 representing participants living in tier-1 and new tier-1 cities and 0 representing participants living in tier-2 to tier 6 cities.

5.2.1 The Effect of Product Scarcity Heuristics on Referral Propensity

The hypotheses were tested using control Group 1 as the baseline. Out of these, a total of 1148 observations were used (upon clicking the SMS where the participants were confronted with the landing page). Table 5-2 shows the estimations of Equation (1), column (1) is the base model and column (2) lists the model after controlling for socio-economic characteristics and demographic variables.

To test hypothesis 1a and 1b, with regard to the effect of scarcity (low- and high-level) on referral propensity (see Column (1) in Table 5-2), the results of the regression demonstrated a statistically significant main effect of Group 3, low-level scarcity ($b = 1.256$, $p < 0.01$) and Group 5, high-level scarcity ($b = 0.744$, $p < 0.01$). Hence, the findings showed that participants nudged with low-level scarcity of 998

items left are significantly more likely to make a referral, supporting the hypothesis 1a. This suggests that confronting existing users with low-level scarcity framed message in a promotional campaign significantly increases the likelihood of them to share with their friends. Although Group 5, high-level scarcity framed message was significant, the coefficient is lower than Group 3, low-level scarcity framed message ($b = 1.256$, $p < 0.01$ vs $b = 0.744$, $p < 0.01$), thus hypothesis 1b is not supported. The referral rate for Group 3 was 40.90% vs Group 5's referral rate of 29.33% (see Table 5-1). Column (2) in Table 5-2 shows similar results.

Table 5-2 Result of regression analysis

	(1)	(2)
VARIABLES	**Share**	**Share**
Group 2	0.647**(0.256)	0.758***(0.268)
Group 3 (Low Scarcity)	1.256***(0.257)	1.403***(0.276)
Group 4	0.525*(0.274)	0.544*(0.277)
Group 5 (High Scarcity)	0.744***(0.274)	0.812***(0.281)
Group 6	0.694***(0.248)	0.716***(0.251)
High Education	--	0.020(0.135)
Male	--	-0.563***(0.136)
Married	--	0.301**(0.136)

Born in 8090s'	--	0.303**(0.137)
Tier-1 Cities	--	0.173(0.153)
Constant	-1.624***(0.207)	-1.844***(0.272)
Observations	1,148	1,148
Ll	-666.8	-653.4

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2.2 The Effect of Social Proof Heuristics on Referral Propensity

To test hypothesis 2, with regard to the effect of social proof on referral propensity, which proposed that framed message with social proof heuristics has a stronger positive effect on online referral than the message without social proof heuristics, the results of the regression analysis demonstrated a high significant main effect on Group 2, presence of social proof framed message ($b = 0.647$, $p < 0.01$). Hence, the findings show that participants nudged with social proof framed message were significantly more likely to make a referral, supporting the hypothesis 2. This also showed that confronting users with social proof framed message in a promotional campaign significantly increased the likelihood of them to share with their friends.

5.2.3 The Synergy Effect of Scarcity and Social Proof Heuristics

To test hypothesis 3 which argued that a combination of product scarcity and social proof heuristics creates a stronger significant positive effect on online referral than either distinct product scarcity or social proof framed message, the results of the regression analysis demonstrated a significant effect of both social proof and low-level

of scarcity in Group 4 ($b = 0.525$, $p < 0.10$) and social proof and high-level of scarcity in Group 6 ($b = 0.694$, $p < 0.01$). However, low-level of scarcity in Group 3 ($b = 0.1.256$, $p < 0.01$) has a higher coefficient than social proof and low-level of scarcity in Group 4 ($b = 0.744$, $p < 0.01$). Hence, hypothesis 3 is not supported. Scarcity-framed messages should be used alone rather than in combination with social proof. However, the effect on social proof is different. Compared with the case that social proof framed message is used alone, social proof combined with high-level of scarcity can increase the likelihood of referral whereas social proof combined with low-level of scarcity can decrease it. These results showed that confronting users with a combination of social proof and scarcity message in a promotional campaign may not increase the likelihood of them to share with their friends.

5.2.4 Heterogeneous Effects of Demographic Variables on Referral Propensity

Next, we re-estimate Equation (1) in different subsamples to investigate the heterogeneous effects across different socio-economic characteristics and demographic variables, including gender, age, marital status, education level and location on referral propensity. Table 5-3 shows the results of subsample analysis.

Table 5-3 Result of regression analysis: Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Low Edu	**High Edu**	**Female**	**Male**	**Single**	**Married**	**60 & 70s'**	**80 & 90s'**	**Tier-2 & above cities**	**Tier-1 cities**
VARIABLES	**share**	**share**	**share**	**share**	**share**	**share**	**share**	**share**	**share**	**share**
Group 2 (Social Proof)	1.094***	0.348	0.788**	0.741*	0.337	1.076***	1.395***	0.349	0.884*	1.073***
	(0.359)	(0.408)	(0.369)	(0.393)	(0.402)	(0.363)	(0.441)	(0.344)	(0.471)	(0.382)
Group 3 (Low Scarcity)	1.519***	1.250***	1.521***	1.271***	1.171***	1.574***	1.824***	1.144***	1.703***	0.921*
	(0.371)	(0.417)	(0.382)	(0.402)	(0.407)	(0.377)	(0.457)	(0.352)	(0.465)	(0.544)
Group 4 (Low Scarcity and Social Proof)	0.368	0.691*	0.874**	0.136	0.523	0.551	0.932**	0.290	0.839	0.464
	(0.390)	(0.404)	(0.366)	(0.438)	(0.402)	(0.382)	(0.454)	(0.356)	(0.547)	(0.329)
Group 5 (High Scarcity)	0.881**	0.736*	0.537	1.084***	0.485	1.060***	1.434***	0.433	1.346***	0.256
	(0.379)	(0.420)	(0.392)	(0.407)	(0.421)	(0.378)	(0.462)	(0.360)	(0.490)	(0.396)
Group 6 (High Scarcity and Social Proof)	0.639*	0.794**	1.319***	-0.221	0.527	0.861**	1.019**	0.524*	0.894*	0.703**
	(0.340)	(0.374)	(0.331)	(0.413)	(0.371)	(0.340)	(0.421)	(0.316)	(0.493)	(0.299)
Constant	-1.646***	-1.593***	-1.504***	1.764***	1.609***	-1.636***	-2.051***	-1.332***	-2.037***	-1.646***
	(0.273)	(0.317)	(0.276)	(0.312)	(0.304)	(0.282)	(0.354)	(0.258)	(0.434)	(0.273)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	619	529	569	579	539	609	508	640	622	526
Ll	-355.0	-309.1	-349.4	-296.2	-298.1	-365.2	-279.0	-385.0	-360.7	-301.8

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

First, social proof framed message has a positive and significant effect on females' ($b = 0.788$, $p < 0.05$) and males' ($b = 0.741$, $p < 0.10$) referral propensity. Although studies have shown that females were found to seek hedonistic (leisure and enjoyment), as compared to males, who treat online shopping as utilitarian (clear objective to fulfil), this finding attributes that when it comes to online referral of a membership card using social proof framed message, it fulfils both hedonistic and utilitarian functions. Furthermore, low-level scarcity has shown a positive effect on females' ($b = 1.521$, $p < 0.01$) and males' ($b = 1.271$, $p < 0.01$) referral propensity,

while high-level scarcity only has shown a positive effect on males' referral behaviors ($b=1.084$, $p<0.01$). In addition, the combination of social proof message and scarcity information only have significantly positive effects on females' referral behaviors. Thus, social proof framed message has significant effect on both sexes but the effect differs when interacting with scarcity framed message.

Second, social proof framed message has a significantly positive effect on lower educated individuals' referral behaviors ($b=1.094$, $p<0.01$), while the effect on high educated individuals is insignificant ($b=0.348$, $p>0.10$). Studies suggest that high-education level users have high persuasion knowledge and thus, less likelihood to share with friends (Fenko & Pruyn, 2017). Firms should design their social media platform as simple as possible, removing any ambiguity, making it easy to share. In addition, low-level scarcity framed message has significant effect on participants with low-level ($b = 0.1.519$, $p < 0.01$) and high-level education ($b =1.250$, $p < 0.01$). Furthermore, the combination of social proof and low-level scarcity ($b = 0.691$, $p < 0.10$) and the combination of social proof and high-level scarcity ($b = 0.794$, $p < 0.05$) have significant effect on individuals with high-level education. Only the combination of social proof and high-level scarcity has significant effect on the referral behaviors of low educated individuals. This showed that besides social proof framed message, when using a combination of two heuristics, it was effective to use either combination of social proof and low-level or high-level scarcity framed message for high-level education users.

Third, on marital status, social proof framed message has positive significant effect only on married individuals' referral behaviors ($b = 1.076$, $p < 0.01$). This finding attributes that married individuals' perceived the membership card to be a useful item to possess and may come in handy when it is needed. Home appliances and consumer electronics products are items that they would need to have in their home. For single individuals, they may be staying with their parents, and thus a lesser need to purchase home appliances and consumer electronics products. Low-level scarcity framed message has a significantly positive effect on both single ($b=1.171$, $p<0.01$) and married ($b=1.574$, $p<0.01$) individuals' referral behaviors. In addition, high-level scarcity framed message ($b=1.060$, $p<0.01$) and the combination of social proof and high-level scarcity ($b = 0.861$, $p < 0.05$) have significant effect on married participants.

Fourth, regardless of age, social proof framed message has a significant effect on those born in 1960s and 1970s ($b = 1.395$, $p < 0.01$). This finding attributes that older generations spend more time and shopping online for home appliances and consumer electronics and younger generations tend to leave to their parents to make the purchase. In the context of this research, using WeChat Mini-Program as the experimental platform which is an integral part of the Chinese society, older generations do not perceive risk in sharing. Moreover, exposure to message from an established brand may alleviate their concern with fraud. Younger generations may share to their peers (especially, newlywed) and older generations may share with their

children as they may be setting up their homes. In addition, low-level scarcity (b = 1.824, p < 0.01), the combination of social proof and low-level scarcity (b = 0.932 p < 0.05), the high-level scarcity (b=1.434, p<0.01) and the combination of social proof and high-level scarcity (b = 1.019, p < 0.01) have significant effect on older generation participants. The younger generation is mostly affected by the low-level scarcity framed message (b=1.144, p<0.01).

Lastly, social proof frame message has a larger significant effect on (b = 1.073, p < 0.01) participants in Tier-1 cities. This may attribute that Tier-1 participants have high incomes and most of them have the tendency to replace their home appliances and electronics products with the latest product offerings. In the same vein, participants perceived that their friends would need such membership card, and thus higher propensity to share to gain social capital. While participants in Tier-2 and above cities are more affected by scarcity framed messages, especially low-level scarcity framed message (b=1.703, p<0.01).

To further test whether the effects in Table 5-3 significantly differed in different subgroups, we estimate the logit models by taking in the interactions (see Table 5-4). The results show that the coefficient of male*group6 (column 2) is significantly negative (b=-1.476, p-value<0.01), indicating that males are less affected by the combination of high scarcity information and social proof message than females. In column (5), the coefficient of tier 1 city*group3 is significantly negative, indicating that individuals living in tier-1 cities are less affected by low scarcity information than living

in other cities. These insights are consistent with the main findings in the subsample analyses.

Table 5-4. Heterogeneous effect estimations using interaction terms

	(1)	(2)	(3)	(4)	(5)
VARIABLES	share	share	share	share	share
group2	1.468***	1.356***	1.221***	1.690***	1.726***
	(0.358)	(0.369)	(0.394)	(0.439)	(0.467)
group3	0.849**	0.447	0.506	1.333***	1.368***
	(0.374)	(0.389)	(0.418)	(0.453)	(0.492)
group4	1.056***	0.644*	0.372	1.273***	0.893*
	(0.351)	(0.361)	(0.394)	(0.429)	(0.473)
group5	0.362	0.835**	0.516	0.910**	0.832
	(0.389)	(0.364)	(0.402)	(0.452)	(0.549)
group6	0.625*	1.276***	0.533	0.987**	0.893*
	(0.339)	(0.329)	(0.371)	(0.418)	(0.494)
HigherEdu*group2	-0.167				
	(0.526)				
HigherEdu*group3	-0.093				
	(0.559)				
HigherEdu*group4	-0.666				
	(0.524)				
HigherEdu*group5	0.328				
	(0.561)				
HigherEdu*group6	0.176				
	(0.505)				
male*group2		0.080			
		(0.521)			
male*group3		0.718			
		(0.556)			
male*group4		0.224			
		(0.518)			
male*group5		-0.713			
		(0.569)			
male*group6		-1.476***			
		(0.527)			
married*group2			0.321		
			(0.522)		
married*group3			0.539		
			(0.558)		
married*group4			0.684		

			(0.522)		
married*group5			0.035		
			(0.554)		
married*group6			0.326		
			(0.502)		
age8090*group2				-0.470	
				(0.543)	
age8090*group3				-0.873	
				(0.575)	
age8090*group4				-0.865	
				(0.538)	
age8090*group5				-0.604	
				(0.575)	
age8090*group6				-0.445	
				(0.524)	
tier-1 city*group2					-0.844
					(0.708)
tier-1 city *group3					-1.101*
					(0.628)
tier-1 city *group4					0.141
					(0.603)
tier-1 city *group5					-0.389
					(0.637)
tier-1 city *group6					-0.218
					(0.576)
HigherEdu	0.107	0.024	0.003	0.015	0.031
	(0.422)	(0.137)	(0.136)	(0.136)	(0.136)
male	-0.570***	-0.316	-0.569***	-0.588***	-0.572***
	(0.137)	(0.420)	(0.137)	(0.137)	(0.137)
married	0.325**	0.306**	-0.048	0.298**	0.302**
	(0.137)	(0.138)	(0.418)	(0.136)	(0.136)
age8090	0.291**	0.359**	0.311**	0.873**	0.306**
	(0.138)	(0.140)	(0.138)	(0.442)	(0.138)
tier-1 city	0.160	0.203	0.172	0.170	0.533
	(0.154)	(0.156)	(0.153)	(0.153)	(0.497)
Constant	-1.876***	-2.005***	-1.641***	-2.173***	-2.115***
	(0.324)	(0.325)	(0.345)	(0.387)	(0.458)
Observations	1,148	1,148	1,148	1,148	1,148
Loglikelihood	-650.5	-638.9	-652.0	-651.6	-649.6

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.3 Experiment Results

The key findings from the current research provided answers on how to effectively nudge users for social online referrals on social commerce platform. First, nudging users with social proof, low-level scarcity, high-level scarcity and a combination of social proof and high-level scarcity framed messages were effective in motivating users to make social online referrals to friends. Among the different groups of framed messages, nudging users with only low-level scarcity framed message showed the most effective in making social online referrals, followed by high-level scarcity framed and social proof with high-level scarcity framed message. Second, nudging users with a combination of social proof and scarcity framed message was less effective than single scarcity-framed messages. Third, we investigate the heterogeneous effects of different framed messages on individuals' referral behaviors across socio-economic and demographic attributes, including gender, age, marital status, education levels and location of the users. We find that social proof framed message has positive significant effect on both females and males and individuals who are lower educated, married, older generations and living in tier-1 cities. Low scarcity message has positive significant effect on all socio-economic and demographic variables. A combination of high-level scarcity and social proof message has significant effect on all socio-economic and demographic variables except on gender. Lastly, a combination of low-level scarcity and social proof message has significant effect on older female individuals who are highly educated. This findings suggest that using low-level scarcity

message is the most effective method for social online referral on social ecommerce platform. Alternatively, social proof message may be used but less effective than low-level scarcity. The use of high-level scarcity and a combination of two heuristics should be used with caution as it may perceived by consumers as lack of credibility.

Social proof and scarcity heuristics are frequently deployed and prominent on social networks. The results of the current research are consistent with the study by Koch and Benlian (2015) who found that demand-based scarcity has a positive effect on consumers' referral propensity as consumers believe that they build more social capital when referring a scarcer offer. Similarly, the results show that using popularity claim of high percentage of people have taken the offer (i.e., social proof heuristic) does play a significant factor in influencing users to make online referrals. The findings from this research are consistent with the study by Jeong and Kwon (2012) who found that social proof framed message using popularity claims (i.e., 94% of consumers bought the product after viewing the site) was effective as it enhanced the perception of quality products, triggering the quality signaling effect and the bandwagon effect of the claim. On the other hand, a possible explanation for high-level scarcity framed message deemed not to be as effective for certain consumer groups might be the fact that its power to trigger psychological reactance is weak. Moreover, the higher the level of scarcity, it might signal that the VIP Plus card which is perceived as a card of "status symbol" decreases, as many people have already taken it, thus further dilutes the exclusivity and uniqueness of the card. A possible explanation why using a

combination of social proof and scarcity framed message not as effective for certain user groups might be that participants were familiar with the framed messages as a marketing trick that "if everything is good, nothing is good". If users perceived that the framed message is manipulated to influence them, they may resist the persuasion to make referrals. Users making online referrals are less likely to react to a persuasion claim, unless it is perceived to be credible. Since consumers often process information based on "mental shortcuts or heuristics", the use of some forms of persuasions claims can be influential and low-level scarcity heuristics was the most effective.

The findings on the socio-economic characteristics and demographics impact on online referrals showed that only low-level scarcity heuristic was effective across all the attributes. Although some of the demographic attributes were shown to be influenced by these heuristics, it is difficult to reflect and derive a conclusive outcome on their effectiveness due to the mixed results and caution to be taken when using them. The prevalent use of smartphones, the number of hours spend on the users' phone daily and the simplicity of WeChat Mini Program do not hinder or pose a barrier even to the low income, low educated or older generation users in China, thus it is not surprising that the results were not conclusive and may be in contrast to those findings associated with research in online purchasing and referral behaviors. Fenko and Pruyn (2017) suggest that for certain consumer groups, using the combination of several persuasion messages may be less efficient than using one message. In addition, empirical study by Kaspar, Weber and Wilbers (2019) on "demographic targeting" focuses on the users'

five demographic attributes such as gender, age, profession interest, place of residence and occupation so as to tailor the advertisement content of webpages to the target group did not demonstrate and suggest a significant influence on brand attitude and website evaluation. This might be discouraging for marketing practitioners on targeting users as it impedes the prediction and consolidation of social online referrals. Hence, this research suggested that the current knowledge is limited and not able to comprehensively understand the mechanism of targeting specific users for social online referrals. Although this research showed the effectiveness of socio-economic and demographic attributes on the impact in low-level scarcity compared with the other heuristics, the present research addressed the processing stage and further research is to be replicated to extend with other relevant constructs to assess the effect of socio-economic characteristics and demographics on the effectiveness of persuasive heuristics on social online referrals at the behavioral level. For example, Fishbein's Theory of Reasoned Action (TRA) concerning the implications of individuals' action and response based on information available to them has been widely used in the context of online shopping behavior (Fishbein, 1976). Factors that can be included besides demographic variables are online referral preference, persuasion knowledge, benefit perception and lifestyle.

Chapter 6 Discussion

6.1 Theoretical Contributions

The findings have theoretical implications that are linked to the hypotheses, not only advancing the understanding of the effectiveness of executing social online referrals, but more importantly in the context of social commerce platform. First, this research provides several important theoretical insights on the adoption of the nascent research topics on digital nudging theory and the persuasion principle using the heuristics of scarcity and social proof in online environment. Results of this research help gain better understanding about how digital nudge combined with persuasion principle can lead to increase in social online referrals in mobile social commerce app.

Second, from a theoretical perspective, to the best of the author's knowledge, there have been no empirical tests conducted on social online referral marketing on social commerce, in particular, using WeChat Mini Program. This will be the first research through a large scale randomized online field experiment that contributes to the literatures in marketing, behavioral science, and information systems, providing evidence the validity of using digital nudge and persuasion heuristics in social commerce for online referrals. In addition, taking this behavioral science research online on a social commerce platform allows reaching out to a larger size and diversity of the samples quickly that was difficult to get in a laboratory environment (Anwyl-Irvine, Massonnie, Flitton, Kirkham & Evershed, 2020).

Lastly, this research also contributes and provides evidence to extend the persuasion principle; the ability to predict consumers' online referral behaviors which are different from the classic offline situations. The research shows empirical evidence of the effectiveness of different persuasion heuristics on online referrals in social commerce context.

6.2 Managerial Implications

The research also provides important managerial implications. Development in web technologies and rise of social networks create opportunities for firms to use social commerce platforms to create viral growth so as to increase the customer base. Firms must understand the importance of generating continuous online referrals on social commerce platform to sustain their business. Applications of nudge theory are often seen in government services but are rare to find them in private sectors, especially in online businesses. This research identifies the benefits of designing digitally nudged persuasive framed messages to engage consumers in social online referral programs utilizing the persuasive principles of scarcity and social proof to increase online referrals to achieve viral growth. By combining the designs of appropriate nudging tools and targeting the right users with a persuasive framed message, firms can craft an effective integrated marketing communication strategy. This research validates the effectiveness and provides guidelines on the design, creation and deployment of persuasion heuristics. It is interesting for platform managers to utilize this research's

approach to see differences in scarcity and social proof heuristics can have a significant impact on the successful outcome of online referral programs. To the author's knowledge, this is the first research that provides practical guides for platform designers using persuasive heuristics of scarcity and social proof to influence consumers' online referrals on a social commerce platform.

6.3 Limitations and Future Research

There are several limitations to this research that should be interpreted with caution but also lead to ample opportunities for future research. First, the experiment was conducted on a WeChat Mini Program though it is the most popular social commerce platform among users in China. User retention rates of Mini Programs are known to be lower than native apps, except for use in mobile gaming. Further research may extend this research framework to other mobile apps, e-commerce and social commerce and for example outside of China using TikTok with their growing popularity and active user base. This research also acknowledges the shortcomings of the Haier's WeChat Mini Programs as they do not have features as compared with other native apps, e-commerce and social commerce platforms that allow for interactive social proof that further enhance trust in the firms. Some e-commerce and social commerce platforms allow customers to leave comments and reviews, displaying the numbers of followers and "likes" from followers which could further influence both users and recipients to share, in addition, plainly using persuasion heuristics of scarcity

and social proof from the Mini Programs may not be convincing enough to entice both the senders and the recipients. Unless the senders know that the recipients have a particular want and at the right time to make a purchase – but how often do you purchase expensive home appliances and consumer electronics?

Second, it should be noted that context is particularly important as different intervention techniques, framed messages and incentives or benefits would lead to different customers' response and outcomes. In particular, the context of industry, environment and situation should be carefully considered. A cross-industry research can be conducted to understand how digital nudging and framed messages can be customized for a particular industry. Further research should replicate this research to look at how these persuasion heuristics can be employed in other business models (e.g., freemium) and for different types of goods. For example, a coffee chain's social commerce platform may find using scarcity and social proof framed messages not effective and that extrinsically motivated message with high financial incentives may be preferred. Paradoxically, higher financial incentives rewarding individuals' altruistic behavior can proved to be detrimental as it undermines their motivation to act altruistically. Digital nudging provides an effective alternative to leverage consumers' intrinsic motivation and desire to share in the social environment.

Third, this research used SMS as an intervention digital nudging tool which limits the generalizability of the findings. For digital nudging to be effective, platforms need to understand the underlying mechanisms of nudging to find out what kind of

intervention technique will work best under what circumstances. Future research should explore other digital nudging tool or technique.

Fourth, the background of this research allowed only for tracking the influence of the persuasion heuristics on online referrals of first stage actors. Further research should examine the effect of second stage actors' upon receiving the promotional campaigns from first stage actors and their response to persuasion heuristics; to study the long-term impact of the digital nudging.

Fifth, this research focused on only two of the six persuasion principles, namely scarcity and social proof. Further research can consider the use of other principles such as reciprocity (e.g., free trials) in combination with either scarcity or social proof heuristics. Additionally, further research can consider other factors (e.g., social distance, social identity or social norm) that moderates the relationship between the persuasive messages and social online referral marketing.

Sixth, this research used a single product category and limits the generalizability of the findings. Also, to note that the findings should be interpreted with caution as online referrals of VIP Plus card is generally considered as low associated risk and a low level of involvement. Future research should consider the use of other product category, for example, experienced goods that consumers may not be familiar with or conspicuous goods that assumed expensiveness.

Seventh, the research sample was active users of the company's Mini-program within the last twelve months at the time of the randomized field experiment. Changes

in the characteristics of the participants may occur during the twelve months duration, for instance, a participant could be married or moved to a new location. An alternative research sample could be constructed based on active users of not more than three months at the time of the experiment.

Eighth, we used VIP Plus membership card where consumers could obtain home appliances and consumer electronics at no cost; a saving of RMB3500 when they used the card to purchase selected home appliance and consumer electronics. We are aware, however, that consumers may be motivated by the extrinsic value that is embedded with the card. Future study may assess whether findings from this research can be replicated without offering extrinsic rewards.

Finally, this research used Haier as the experimental site which is an established and trusted brand in China and internationally. It would be interesting for future research to extend the current research to investigate the relationship between different persuasion heuristics (i.e., especially social proof as a substitute of trust) and online referral outcomes with unknown brand, maybe a young start-up can be a good choice). In this case, the use of implicit social proof (e.g., as seen in many media banners) may be more effective than using explicit social proof (e.g., purchase or referral counter) as it takes a longer time for young start-ups to attain a certain level of prior online referrals. While limitations exist in this research, the results enable us to gain a better understanding of the consumers' psychological and behavioral responses to social commerce online referrals with persuasive framed messages.

Chapter 7 Conclusion

Social commerce is remarkably different from e-commerce and is set to revolutionize the way people shop online. The integration of social connections and social transactions in a single platform make it possible for people to shop seamlessly. This resulted in shifting of power from firms to consumers and no firms can afford to ignore it but to embrace the change, find new ways to adapt and connect to consumers. As competition between social commerce intensifies, each platform is offering incentives and employing persuasive techniques and strategies to achieve online referrals to help grow their user base.

Even though persuasive principle is prevalent on e-commerce and social commerce websites, previous research in this area has paid little attention towards studying the effectiveness of persuasion heuristics in influencing consumers' online referral behavior. It is timely and imperative that research focus on persuasion principle on social e-commerce websites to create online referrals given that social commerce has gained traction with consumers to become an integral part of our life. Additionally, firms can embrace digital nudging to give people information and choices that influences their behavior into making better decisions and improving their lives.

This research presented the important first steps how firms can increase awareness and word-of-mouth viral marketing using exposure from digitally nudging framed messages with persuasion heuristics of scarcity and social proof for social online referral marketing programs effectively so as to achieve an increase in online

referral rates through a randomized field experiment on a multinational home appliances and consumer electronics social e-commerce platform using WeChat Mini Program.

The findings from this large-scale randomized field experiment are consistent with the previous studies using persuasion heuristics on online referral behaviors. Customers when digitally nudged with the framed message will behave according to the persuasion heuristics, with customers making the most referrals to friends and acquaintances when they are presented with scarcity and social proof framed messages. The results demonstrate that a low-level scarcity framed message increased the likelihood and is the most effective in generating online referrals. Furthermore, this research provides an understanding of how users' characteristics such as gender, age, level of education, marital status and location impact social online referrals. This research further offers important managerial implications that firms should target customers with only low-level scarcity framed messages in their social online referral promotional campaigns and using the combination of scarcity and social proof framed message simultaneously should be used with caution, because it might not be effective for specific consumer groups, even though it does not have an adverse effect.

In addition, this research contributed to the broad literatures of information systems, behavior science and marketing as little research has been conducted on how firms can use digital nudge theory combined with persuasion principles and incentive for social online referral marketing. The research's limitations provide areas for future

research. For example, this research focused on only two of the six persuasion principles, namely scarcity and social proof. Future research can consider the use of other principles such as reciprocity (e.g., free trials) in combination with either scarcity or social proof heuristics. Additionally, further research can consider other factors (e.g., social distance, social identity or social norm) that moderates the relationship between the persuasive messages and social online referral marketing. Future studies can use this research as a springboard to develop more sophisticated techniques in other contexts to motivate users' engagement for online referrals on social commerce platforms.

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