

Bringing E-commerce to Social Networks

Zhao Huang^(✉) and Wang Yang Yu

Key Laboratory of Modern Teaching Technology,
Ministry of Education, Xi'an 710062, People's Republic of China
{zhaohuang, ywy191}@snnu.edu.cn

Abstract. Social commerce is where e-commerce meets social networks. Links between social network users are being leveraged to generate and propagate word-of-mouth about a products, services and brands, creating new business opportunities, and more specifically, a new channel for online business. However, a close look at the academic and practitioner literature on e-commerce and social networks reveals a clear lack of consensus on social commerce concepts and implementation mechanisms. We argue that without such consensus, social commerce might not reach its full potential. Therefore this paper starts by providing an overview of social commerce research and practice in light of the wide attention it has drawn recently. We then propose a social commerce framework consisting of three key parts, namely implementors, enablers and activities. Using Facebook APIs and plugins, we design, develop and deploy a set of social commerce applications as proof-of-concept of our proposed framework.

Keywords: Social commerce · E-commerce · Social network · Viral marketing · Facebook API

1 Introduction

Nowadays people of all ages are using social media services including social networks such as Facebook, Twitter and LinkedIn to connect with their online communities and to generate and consume content. Businesses perceive this extensive and increasing use as an opportunity for new business applications [1] that fall within the realm of “social commerce”. Generally speaking, social commerce is an Internet-based commercial application leveraging social media and Web 2.0 technologies which support social interaction and user generated content in order to assist consumers in their decision-making process for acquiring products and services within online marketplaces and communities [2]. In recent years, social commerce has proliferated not only because social media is popular, but because user participation, one of the core features of Web 2.0, has a significant impact on business [3]. Companies are moving beyond their corporate websites and taking an active part in social media because social media users participate in the marketing and promotion of their products and services.

Social commerce is an opportunity for businesses to leverage social media capabilities, specifically social ties (aka links) between users, in order to strengthen their strategies and achieve their goals. Rowan and Cheshire [4], for instance, adopted Facebook pages to implement social commerce for several of their brands, even though their

products are mostly sold through online and offline retailers. They obviously have their corporate websites, various brands websites, and websites for individual product lines. Still, some Facebook pages dedicated to their products provide e-commerce functionalities for users to purchase those products, making Procter and Gamble one of the early adopters of social commerce.

Even though the aforementioned facts point to its rapid development, its nascent popularity, and the increasing attention dedicated to it, there is limited research that seriously examines the concept of social commerce, let alone its implementation [5]. As argued by Wang and Zhang [6], one of the distinct challenges of social commerce research is conceptualization, due to various points of view and positions and conceptual ambiguities including definitions and scopes. Existing academic research focuses on social shopping and regular e-commerce websites. Olbrich and Holsing [1] for example, analyze a social shopping community called Polyvore to study the effectiveness of social shopping features. Choi et al. [7] study e-commerce websites that offer rating, commenting and recommending functionalities in order to understand how people are influenced by social activities enabled by such functionalities.

Hence we believe it is important to clarify the concept of social commerce and identify mechanisms for its efficient and effective implementation. To this end, this paper explores social commerce by discussing and refining its various definitions, and by proposing a social commerce framework consisting of the following key elements: implementors, enablers, and activities. The paper also addresses social commerce implementation based on the proposed framework, using simple and freely available Web 2.0 technologies.

2 Social Commerce: Literature Review

The term “social commerce” refers to the delivery of e-commerce activities, services and transactions throughout social media environments [8], and according to Wigand and Benjamin [9] it consists of applying social media applications to shape business. Huang and Benyoucef [2], focusing on the user’s perspective, give a more comprehensive definition where “social commerce” denotes a more social, creative and collaborative approach used in online marketplaces, supporting social interaction and user generated content in order to assist consumers in their decision-making process for acquiring products and services. Undoubtedly, social commerce involves multiple disciplines, including marketing, retailing, computer science, sociology and psychology, which contributed to the diversity of its definitions. Indeed, there are several conflicting characterizations of the concept in the literature. (1) Some researchers assert that social commerce is to sell products and services while others claim that it includes branding and marketing; (2) some regard social commerce as equivalent to social shopping whereas others differentiate between the two concepts; (3) some affirm that social commerce is to connect businesses to consumers (B2C) while others see social commerce as connecting consumers to consumers (C2C) or individuals to individuals, and (4) some claim social commerce to be a new phenomenon while others do not perceive it as new. We discuss these points of view below.

- (1) **Social commerce for selling or marketing.** Social commerce is seen by Stephen and Toubia [10] as marketplaces where individual sellers can sell products by assorting them on personalized online shops, so they receive commissions on sold products. Leitner and Grechenig [11], who perceive social shopping and social commerce as the same thing, define social shopping as a unique e-commerce approach which offers a similar environment to social networks for consumers to collaborate and shop together. In contrast, Amblee and Bui [3] describe the characteristics of social commerce as facilitating the shopping experience and supporting social interactions by sharing the experience and aggregating consumer evaluations. In these two cases, social media and other technologies are devised to pursue marketing and communication rather than sales, although an increase in sales could be the ultimate goal. Such position is somewhat adopted by Constantinides and Fountain [5] who state that the basic differences between social media applications and previous internet applications is that the user, as an essential contributor, is a new marketing parameter instigating a migration of market power from products to consumers and from traditional mass media to new personalized ones. This highlights the importance of forming a relationship between the business and its customers. In other words, this is a way to build trust and relationships between organizations and customers in order to form loyalty. Based on the above discussion, it is clear that social commerce is not just limited to selling, but also includes marketing. Additionally, both selling and marketing are more affected by the power of users than the power of sellers, although sellers provide original content such as information, photos and videos of products, and set up events that users can participate in.
- (2) **Social commerce and social shopping.** Some researchers see social shopping as equivalent to social commerce while others do not. But when social shopping is seen as equivalent to social commerce, the focus is usually on selling and buying rather than on marketing. For instance, as indicated by Kang and Park-Poaps [12], social shopping is a consumer behaviour involving consumers interacting with each other through online interpersonal communication in the process of shopping. Furthermore, Leitner and Grechenig [11] describe social shopping, which they also call social commerce, as a “conventional shopping platform with community driven functionalities”, and the examples they provide are collaborative shopping networks such as ThisNext and Kaboodle as well as B2C social shopping websites such as Threadless and Zazzle. These websites are mostly known for shopping. On the other hand, characterizations that differentiate social commerce from social shopping include marketing and promotional activities undertaken by users who voluntarily share their shopping experiences. Well-known social shopping websites such as ThisNext and Kaboodle provide a bookmarking functionality, so users can share their bookmarks of items they discovered. Beisel [13] describes social commerce as creating places where people collaborate online, get advice from trusted individuals, find products/services and then purchase them, while describing social shopping as the act of sharing the experience of shopping with others. Although the main goal of social shopping is for users to gain shopping experiences for better purchasing decisions, merchants do use social shopping websites to

promote and sell their products. Providing shopping knowledge does not guarantee that users who saw the information will buy the items, but it increases product awareness. Furthermore, Wang and Zhang [6] state that social shopping is part of social commerce, and thus has a narrower scope than social commerce. In light of this, we argue that social commerce can include social shopping, whereas social shopping cannot include social commerce. In other words, social shopping is a subset of social commerce, and social commerce primarily signifies users' shopping and/or buying activities.

- (3) **Social commerce connects business to consumers or consumers to consumers.** With regards to whether social commerce connects businesses to consumers or consumers to consumers, we believe that social commerce encompasses all aspects of both connections. But some researchers seem to make a distinction. For instance, in addition to differentiating social commerce from social shopping, Stephen and Toubia [10] claim that social shopping connects consumers invigorated by online word-of-mouth whereas social commerce connects sellers. Clearly, using social media for commercial purposes is not reserved for business organizations, but individuals can also use it - and they are in fact using it. Individual handicraftsmen sell their creations through websites like Etsy (<http://www.etsy.com>), known as a community based e-commerce website with a connection to social media. Wang and Zhang [6] argue that social commerce is a form of peer-to-peer communication, where users spread out a persuasive viral message by word-of-mouth through social networks to increase a company's brand recognition, product awareness and adoption. Gaulin [14] further support this view and indicate that that social commerce content is "crowdsourced" (a term referring to user-generated content) to the users; where the concept of "user" covers not only individuals, but also groups and communities. Finally, note that social commerce encompasses both online and offline business connections and does not necessarily mean that all business transactions must take place online. For example, Starbucks provided a coupon for a new coffee promotion event, which could be shared through social media, so anyone was able to print and bring it to an offline store to get the free coffee.
- (4) **Social commerce is new or not.** With respect to whether social commerce is new or not, we note that the term "social commerce" itself is relatively new because it first appeared in 2005, but the concept is not [2]. When there was no fast transportation, markets were not just places for selling and buying but they were places for people to share information [15]. Even when there was no Internet, people still gathered information about products and services from testimonials and comments made by their family, friends or colleagues. Nowadays, a product catalogue on a social commerce website such as Kaboodle or ThisNext is filled up by individuals, and product information is delivered and propagated on social media through individuals' posting and sharing. Interestingly, as early as 1999, Amazon and Epinions had already adopted some of the basic social features, such as referral shopping, wish lists, email to friends, and sharing experiences and opinions [16]. Thus, even though social media is relatively new and is being used by consumers and businesses as a new communication channel, the fundamental notion that commerce gains power from individual users' sharing experiences is not new. It has just been

made faster, better, and broader through the use of social media. This is in line within a study by Wang and Zhang [6] who claim that social commerce reuses some of the traditional e-commerce strategies to bring social networks to the forefront to connect shoppers with one another or with products. Social commerce is not a new application or technology, but rather an evolution of e-commerce.

3 Social Commerce Framework

Based on the discussion in the previous section, we identified several characteristics of social commerce: e-commerce relying on social media and Web 2.0 technologies; not being limited to selling and buying but including management and operations, however mainly marketing; facilitating participative, contributive and collaborative activities by users through social media; and its activities can intensify the overall effects of specific business goals.

With this in mind, the concept of social commerce can be defined as e-commerce, in a broad sense, using the advantageous characteristics of Web 2.0 technologies such as participation, contribution and collaboration, which strengthen the effectiveness of commercial activities of users. We propose the following framework to highlight how we see this concept.

The framework (Fig. 1) illustrates social commerce’s related entities and their inter-connections. First, there are two entities involved in social commerce: Enablers and Social Commerce Implementors. Enablers are social media users who are willing to participate in activities and contribute ideas, opinions and knowledge for use by other networked users. Enablers can also be customers who look for product information and possibly share their purchasing knowledge and experiences with others. Social Commerce Implementors, however, are operating bodies that implement social media or Web 2.0 technologies for the purpose of commercial activities such as advertising, promotion and selling. These Social Commerce Implementors are not limited to organizations, but also include individuals such as artists (e.g., musicians, photographers, movie stars, etc.), athletes and architects, who use social media to promote and/or sell their products and services.

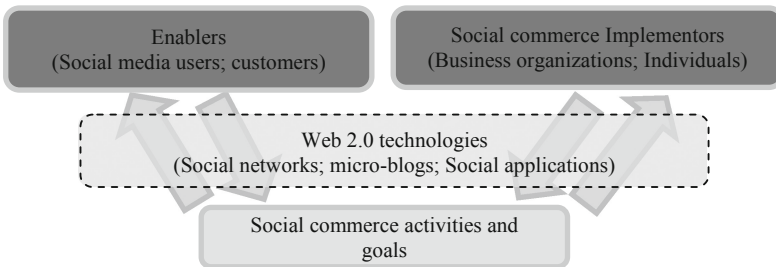


Fig. 1. Social commerce framework

Social Commerce Implementors and Enablers are connected by social commerce activities and goals. Because Social Commerce Implementors leverage various Web 2.0

technologies which are well suited for their strategies or goals, these technologies allow Enablers to perform activities that support Implementors in achieving their strategies or goals. For example, a Social Commerce Implementor can utilize a blog to promote a product and to provide product information, then, through that blog, Enablers can propagate that information to their friends by sharing it within their social network. In other words, the original product information is provided by the Implementor through the blog and the Enablers who discover the product information participate in sharing that information (See Fig. 1). Most of all, in the participative activities of the Enablers, there should be a willingness or intention to take on roles that support certain business goals. Enablers can also be called “fans” in the Facebook terminology, since Facebook users become fans of certain brands once they click the “like” button on the brand pages. Although it is hard to regard users who click a “like” button as “real fans” of a brand, the action of clicking the “like” button signals the user’s willingness to see postings by the brand. This is because by clicking the button, all shared postings from the brand will appear on that person’s Facebook newsfeed.

Unlike traditional Web 1.0 ways of communication, in which organizations directly promoted or advertised their products and services through available media, such as corporate websites (where a user has to visit the corporate website to find product information), in a social commerce environment, Enablers discover product information anywhere and share it with their friends if they are interested in it. This means that product information is actually delivered by Enablers rather than by the organization itself, and that information can be exposed through the Enabler’s newsfeed, where all people who are connected to him/her can see it.

Table 1 shows typical social commerce activities as identified from the literature. Liang and Turban [8] classify social commerce activities into four categories, namely “social media marketing”, “enterprise management”, “technology, support, integration” and “management and organization.”

Table 1. Social commerce activities

Choi et al. [7]	Curty and Zhang [16]	Constantinides and Fountain [5]	Liang and Turban [8]
Awareness	Branding Content creation	Informing new opinion leaders	Social ads/viral marketing: recommendation/referral/affiliate marketing/video marketing
Consideration	Traffic generation Engagement Innovation/ Ideation Lead generation	Listening to customer’s voice Personalized one-to-one marketing Partnering with talented amateurs	Marketing research: ratings/reviews Forum/discussion group/ Social interaction
Conversion	Purchase decision	Providing personalized products	Direct selling
Loyalty	Loyalty/advocacy After sales service	Interaction with customers	Social CRM, customer service

This categorization broadly exemplifies activities related to commercial intentions and involvement through the use of social media. Choi et al. [7] list three purposes for using Web 2.0 technologies to achieve business goals: internal purposes, customer-related purposes and working with external partners/suppliers. These purposes are largely meant to increase speed, effectiveness, volume, and revenue; and to reduce cost and time. Constantinides and Fountain [5] list “reaching” and “informing” new online opinion leaders, “listening” to customers’ voices, personalized one-to-one marketing and launching corporate blogs and podcasts as a channel of interaction with customers, partnering with talented amateurs and providing customers with personalized products. Curty and Zhang [16] list activities using social media, particularly for marketing; branding, content creation, traffic generation, engagement, innovation/ideation, lead generation, purchase decision, loyalty/advocacy, and after sales service.

Actually, the activities listed in Curty and Zhang [16] are categorized based on the so called Marketing Funnel which encompasses the following elements: Awareness, Consideration, Conversion and Loyalty. The Marketing Funnel was (and is still being) used to establish marketing strategies. In other words, the elements of the marketing funnel, namely awareness, consideration, conversion and loyalty can be seen as goals that Implementors strive to achieve. Hence, we classified the aforementioned social commerce activities based on the elements of the marketing funnel (see Table 1).

However, a new version of the marketing funnel dubbed the new customer lifecycle was proposed by Forrester research. It consists of the following four phases. Discover is the phase where a customer discovers brands, products or the need for products through positive word-of-mouth or other accessible media. Explore refers to a customer’s journey of browsing, testing or trying a certain item to experience it until the purchasing decision is made. Buy includes not only purchasing but inventory look up, perceived actual value of the item, and the buying experience. Finally, Engage refers to the customer’s activities after the purchase.

As Liang and Turban [8] points out, the traditional marketing funnel does not seem to reflect the customer’s standpoint. In fact, it is written from an organization’s point of view. In the new customer life cycle, customers discover, explore, buy and engage, whereas organizations endeavor to have customers discover in order to be aware of the brand and products, have them explore and be informed enough to consider the products, have them buy to be converted into actual buyers, and have them engage as loyal customers.

Consequently, with the new customer life cycle which stands for a customer’s (i.e., Enabler’s) perspective and the marketing funnel which represents an organization’s (i.e., Implementor’s) standpoints, achievable business goals from a social commerce implementation can be organized as shown in Fig. 2.

Enablers discover products or feel the need for them, and then explore to find detailed information about the products that satisfy their needs in order to make a good purchase decision. Then, Enablers buy the products and engage by sharing their shopping experiences with their community. Implementors utilize Web 2.0 technologies to have Enablers discover products and feel the need for products (to achieve the business goal of product awareness); have Enablers explore information provided by the Implementors (to achieve the business goal of consideration); have Enablers buy the products

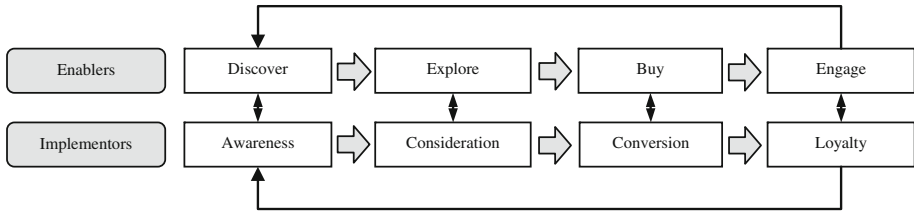


Fig. 2. Phases of business goal achievement from each entity’s standpoint

(to achieve the business goal of conversion); and finally, have Enablers engage in contribution (to achieve the business goal of loyalty).

Note that from an Enabler’s perspective, activities would directly reflect a key characteristic of Web 2.0 as described by O’Reilly [17], namely “Harnessing collective intelligence”. This characteristic is leveraged for the sake of users’ collaborative, participative and contributive activities which involve all phases of goal achievement from an enabler’s standpoint (i.e., discover, explore, buy and engage) (see Fig. 2). For instance, a need for a product can be awakened by a contributive action such as a recommendation from a friend.

4 Using the Framework to Implement Social Commerce

In this section we show how the framework can be used to implement and deploy simple applications (apps) that realize a set of social commerce activities. We use Facebook APIs and plugins for they are easy to use and freely available, but we could have used those of Google plus, Twitter, or any other social network.

4.1 Implementation Process

We implemented four proof-of-concept social commerce apps, namely: a discount coupon sending app for viral marketing, a rating items app for market research, a limited time sales app for direct sales, and a photo contest event app for loyal customer contribution (see Table 2).

Table 2. Apps to perform social commerce activities

Apps	Social commerce activities	Business goals
(1) Discount coupon sending	Viral marketing	Awareness
(2) Rating items	Market research	Consideration
(3) Limited time sales	Direct sales	Conversion
(4) Photo contest event	Loyal customer contribution	Loyalty

- (1) **Discount coupon sending:** Social events held by Social Commerce Implementors are numerous, and decisions to select a certain type of event could depend on what Social Commerce Implementors want to pursue, yet the purpose is usually the same;

events require participative activities which will lead to the promotion of a certain item and its brand name by social media users themselves. Constantinides and Fountain [5] found that purchasing decisions are strongly influenced by peer reviews, referrals, social networks and forums. Thus, coupon sending by networked friends can be more persuasive than that by the brands themselves. Coupon sending for a discount deal is designed to give a user a discount coupon, which can be used in a store, by sending a message of the deal to friends on a social network and suggesting to them to purchase together, so that they can get a 50 per cent discount on any product in the store.

- (2) **Rating items:** As discussed earlier, consumers no longer rely on traditional marketing media such as print or TV ads, but rather tend to believe their peers' opinions more. Consumer ratings and comments, for instance, represent one of the most important means for sellers to respond to consumers because they reflect what consumers really want and how they want it. Therefore, the insights gathered from ratings and comments can serve as input for product development and/or improvement. The rating app targets users who are regular visitors to a corporate social network page.
- (3) **Limited time sale:** One classic marketing strategy to sell a product is to have customers feel that the product is somewhat special, by giving them limited access, limited offers, limited availability or time sensitive deals because when resources are scarce, people tend to put more value on them. In addition, the "Buy" stage in Forrester's new customer lifecycle considers the perceived actual value of items and the experience from the customer's standpoint. This app offers limited items for a limited time. When a user sees the limited offer through a newsfeed, he/she can reach to this app by linking from the newsfeed and purchasing items as long as the items are available by clicking the "Buy" button.
- (4) **Photo contest event:** User generated photos of products are excellent marketing resources since users act as marketing personnel for the company. Besides, content created by users is more credible. As discussed earlier, such credibility strongly affects resources, rendering them more believable, persuasive and trustworthy to customers [3]. The photo contest event encourages users to post their photos and to allow people to vote on them, so that the photo with the highest vote will be rewarded. The activity requires users to draw more people such as friends, family members and colleagues who are willing to vote on their photos. Users discover the photo contest event information through a newsfeed or a message from their friends. Users can then visit the page through a link from the newsfeed or message and vote on the photo they like. They can also comment on and share any photo posted in the app.

We chose to develop the four social commerce apps using Facebook APIs and plugins (freely available and simple to use Web 2.0 technologies), which are known to connect to a large pool of potential audiences. For that we require a web server with SSL to store the apps and a database to store data. Since Facebook requires developers to provide an HTTPS web address of the app to protect user information, SSL is required on the client side. PHP SDK was installed within the client's web server. SDKs are available from Github (<https://github.com>), an external developers' community. The

functionalities of each app are summarized in Table 3, each one divided into primary (i.e., core requirements for an app to fulfill its role) and supplementary (i.e., support an app but an app can fulfill its tasks without them) functions.

Table 3. Apps and their functionalities

Apps	Types of functionalities	Functionalities
Discount coupon sending	Primary functions	Sending a message/displaying the information/accepting an offer/ issuing a coupon
	Supplementary functions	Sharing, liking
Rating items	Primary functions	Listing, viewing, rating, commenting
	Supplementary functions	Sharing, liking
Limited time sales	Primary functions	Viewing of products, payment
	Supplementary functions	Sharing, liking
Photo contest	Primary functions	Listing, uploading, viewing, voting
	Supplementary functions	Sharing, commenting

Figure 3 shows the communication flow between a client, which contains the apps, and the server (in this case Facebook) where the apps live. When an app is displayed with data on Facebook, the app needs to call the corresponding Facebook APIs (e.g., when it accesses a user profile). Facebook then returns the data to the app, and using the data, it can show the complete results to the user.

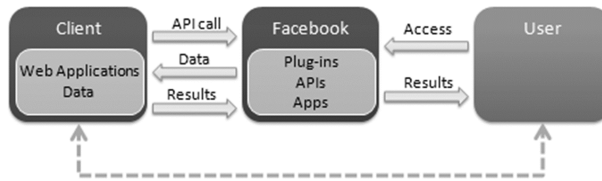


Fig. 3. Social commerce app communication map

There are six steps in the development process of a social commerce app within the Facebook platform: (a) installing a SDK; (b) creating a Facebook Page; (c) creating an independent app on the client side; (d) registering the app on Facebook developer; (e) modification of the app if needed (some functions require a unique access token to perform, and in order to obtain it, the App ID and App Secret, which are created after the registration, are required); (f) adding the app on Facebook Page Tap. Once the app is completely settled as a Facebook app, in some cases, users’ permission is required to access their profile when they first access the app.

The discount coupon sending app allows a user to send a message to a friend (or friends) by clicking the “Send a message to your friends” button as shown in Fig. 4(a). If the user is logged in (in most cases due to the fact that users would discover this while logged in to Facebook), by clicking the button “Send a message to your friends”, a dialogue where a user can write a message and select recipients pops up. If it is the first

time the user accesses the app, the user is asked to allow the app to obtain his/her data, particularly a list of friends. This allows the dialogue to suggest friends to the user, so that he/she can select them.

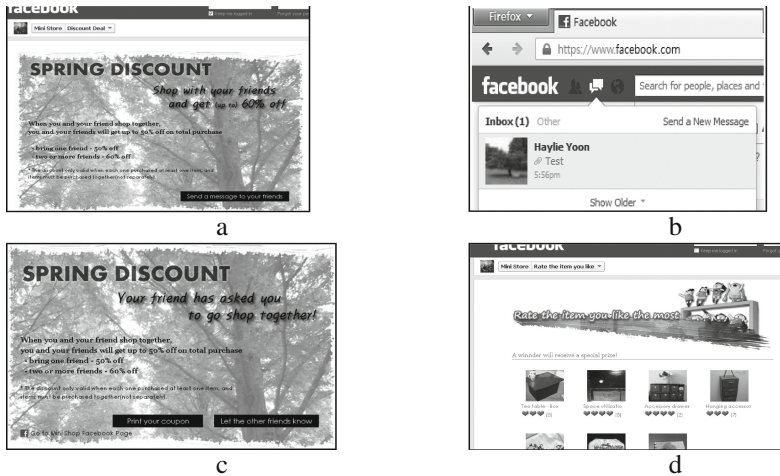


Fig. 4. (a) Discount coupon sending app, (b) Message on a recipient’s side, (c) Recipient’s view when the message is clicked, (d) Rating app

Checking the login status performs two tasks: verifying if the user is logged in and checking if the user already gave permission for the app to access a list of his/her friends. Once the message has been successfully sent, the discount coupon link becomes visible and the user can print the coupon.

At the same time, the recipient can see the arrival of the message (see Fig. 4(b)). The recipient is able to see the discount information shown in Fig. 4(c) by clicking the message in Fig. 4(b). The information in Fig. 4(c) includes two links: one to print out the coupon and one to send a message to other friends.

The rating app is shown in Fig. 4(d). A user can click items on the app and each item has its detailed view as in Fig. 5(a), which contains information on the item, rating, commenting, liking and sharing functions (see Fig. 5).

The Limited time sales app is shown in Fig. 5(b). As long as the app is accessible, anyone including non-Facebook users can purchase the items since the app shows product information and the payment method using PayPal. The use of the PayPal payment method is similar to that of Facebook plugins. By configuring a selected button with information regarding products (e.g., name, price, shipping cost, tax), the code of the payment button can be obtained, copied and pasted into any page (see Fig. 5(c)). The photo contest app is shown in Fig. 5(d). The functionalities used for this app are that users can upload photos with a simple message, and anyone can view and vote on the photos in each detailed view by clicking a photo.

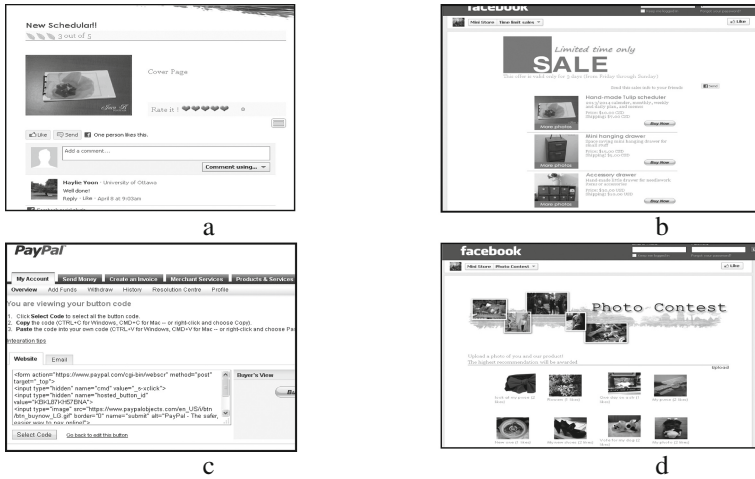


Fig. 5. (a) Rating view with rating, liking, sharing and commenting functions, (b) Limited time sales app, (c) PayPal Buy Now button setting, (d) Photo contest app

4.2 Discussion

In this subsection we briefly discuss our social commerce implementation process using Facebook’s development platform (API and plugins). Our discussion is guided by the following attributes from the IEEE Standard for software quality [18]: resource economy, completeness, security, testability, software independence, and ease of learning.

In consideration of whether the implemented apps are capable of performing specific functions under stated conditions using appropriate amounts of resources, an app consists of two sections; client side where the actual app is stored and service provider’s side where the app is embedded. This means that server side recourses are utilized and even if some functions are not available on the server side, they can be supported by developing them on the client side. Plugins can cause inefficiencies, for example, the photo contest app, created using the Like plugin, stores the Likes counts on the server side, so all count data has to be called from the server side, which makes the display very slow.

With regards to whether there are sufficient functions to satisfy developers, multiple SDKs including JavaScript, PHP, iOS and Android are supported by the Facebook platform, and various functions can be implemented with JavaScript alone. Additionally, there are different ways to call data. For instance, to fetch a user’s name, one can query the data or use the Graph API with the GET function. But unlike Google based applications which are interoperable with various social networks, apps created for Facebook platform are not.

Regarding the question of whether the apps are secure enough to detect and prevent information leak, loss and illegal use, utilizing social networks is to tap into user demographic data which can be used for market research. To access demographic data, apps need to obtain permission to access user profiles. An access token, which stays valid for a couple of hours to allow certain activities on an app, is made available to developers. Once a user gives permission, the app can access user data such as list of friends,

favourites, likes, education, work, and status. Although the permission request including information on what to access pops up when a user accesses the app, if the user does not pay attention and simply clicks to allow it, the user would not know what kind of information can be exposed to the app. It is the user's responsibility to be aware of what is being shared.

Debugging apps is not very different from that of other software applications, and Facebook provides various debugging tools. Problems faced by developers are that it is hard to find an error when the code is quite long, and sometimes, they are not even sure if the data they called is actually called or does exist. Using debugging tools, developers can test data availability and workability. In addition, JavaScript SDK which contains expanded checking procedures can be used for test purposes.

Do the apps depend on the platform they are being developed on? Is the platform stable? An app can perform without necessarily being embedded in a Facebook page, but to access the pool of information the app needs to call an API which requires an access token. But once it is registered as an app on the server side, it is required to contain an app ID and an app Secret to communicate with the Facebook platform. When a user is within Facebook, apps can be used seamlessly once the user gives the apps permission to access the user profile. Finally, the Facebook platform reflects one of the characteristics of Web 2.0: perpetual beta. Some functionalities, methods and objects have been changed, disappeared, or are being deprecated. Therefore, apps using those methods and objects have to be rewritten.

Is it easy to learn how to create apps? As for any other software project, the complexity of app development depends on the complexity of the required functionality. Apps that perform simple tasks, such as the photo contest and rating items created in this study are not as complicated as game software or e-commerce solutions. Therefore, programming expertise could be a less important factor. Thus, apps can be complicated depending on the required functionality to perform certain tasks. In contrast, the biggest hinder to develop apps using web APIs is how much time the developer has dealt with certain APIs and how well he/she knows about them. To create an app using what the service provider offers, the developer has to work in ways the provider allows him/her to do.

5 Conclusion

As a first step, this research sought to clearly establish the concept of social commerce. Hence various definitions from the literature and their different standpoints were analysed. We then proposed a social commerce framework consisting of Social Commerce Implementors, Enablers and their activities which rely on Web 2.0 technologies. Social commerce activities were categorized in the four stages of the marketing funnel, namely Awareness, Consideration, Conversion and Loyalty.

As a second step we addressed social commerce implementation and developed proof-of concept social commerce apps, each one performing specific social commerce activities. Four different social commerce apps were implemented, each one designed to achieve a goal that fits within a stage of the marketing funnel (a coupon sending app

at the Awareness stage, a rating app at the Consideration stage, a limited time sale app at the Conversion stage, and a photo contest app at the Loyalty stage).

Overall, the contributions of this research consist of capturing the concept of social commerce in a framework aimed at supporting social commerce researchers and developers in understanding the core mechanisms of this concept. Further, social commerce implementation was investigated.

However, there are limitations to this research. First, although social media can be utilized in a B2B setting, this study has only dealt with B2C aspects. In addition, despite the fact that e-commerce includes not only selling and buying but also the whole spectrum of management of suppliers and customers, the proof-of-concept apps built for this study focused primarily on promotion and selling. Second, the apps were created using the Facebook platform and its APIs, even though there are other technologies available. Third, the apps were created as initially planned, but this research did not deal with how effectively they perform. The intended purpose was to understand what is available, how to utilize it, what the obstacles are, and how to overcome them through the app development process. Thus, social apps can be created with more sophistication and efficiency, and the evaluation of these apps to see how effectively they perform will be a next step, along with a thorough and formal evaluation of the development process itself.

Acknowledgments. This study was supported by a research grant funded by the “the Fundamental Research Funds for the Central Universities” (GK201503062) and “Support by Interdisciplinary Incubation Project of Learning Science of Shaanxi Normal University”.

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