A Novel Technique to Find Authenticity of products in E-Commerce

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Abstract— E-commerce is ever-growing online business in the world economy. Wherever there is a grooming business, there comes an obstacle to overcome. Though E-commerce provides a flexible and convenient shopping experience to consumer it has some issues. The main common issue faced by online consumers is counterfeit products in E-commerce websites. This paper proposes a novel technique to address this issue in E-commerce. The proposed technique gives a code to each product called as Original Product Verification Code (OPVC) to authenticate the product originality. This code is generated using the data provided by product manufacturer. It is a unique code printed on the product and consumer is provided with an application to verify the code with the help of mobile device or computer. Each code is deactivated once the product with respect to this code is sold. Hence, it prevents copying of the same code to a counterfeit product. If a deactivated code is scanned then an immediate trigger notification is sent to the respective manufacturer of the product to alert E-commerce site. OPVC is generated using obfuscation algorithm. This algorithm randomly selects data from manufacturer’s details and uses different mathematical function and programming logic to generate a unique original product verification code. The proposed work contributes many advantages to consumer and manufacturer of the product by terminating the counterfeit products in E-commerce. As a result, it helps to improve the revenue of the organization.

Keywords— E-Business; E-Commerce; Counterfeit Products; B2C; Authenticity of Products; OPVC;

I. INTRODUCTION

Technological advancement of the last decades is created an atmosphere, in which every organization from a startup to multinational business is looking for a virtual shop to actively sell their products to more number of consumers [1]. As a result of advanced development in information technology, which provide a platform to initiate business through internet called as online business or E-business. E-business is a revolution in business existence based on a new model and digital processes, fueled by hyper growth and ideas. An upcoming new trend setter for the online industry is cost reduction, door step delivery seeking to compete more effectively in their markets [2]. The conduct of business process such as Product listing, Inventory management, Product development, Risk management, Market survey, Supply chain management, Business intelligence, Customer relationship management, Logistic management, Financial management and all kinds of pre-sale and post-sale efforts are all together involved in E-business. The process involved in buying and selling of products in E-business is primarily termed as E-commerce [3].

E-commerce is a subset of E-business. The e-commerce industry is growing at a remarkable pace due to high penetration of internet and sophisticated electronic devices [4]. The advantages of e-commerce are Convenient, Time saving, More options for products, Easy to compare, Easy to find reviews, Coupons and deals. In addition, Increased customer base, Rise in sales, 24/7, 365 days, Expand business reach, Recurring payments made easy and Instant transactions [5].

Electronic commerce on its broad hand has created various categories of business between manufacturer and end-user. The various categories of E-commerce are as follows.

- Business to Consumer (B2C)
- Business to Business (B2B)
- Consumer to Consumer (C2C)

B2C is a transaction conducted over the internet between business and consumers. It is also known as e-tailing. The B2C model involves a business selling directly to its consumers via a website. Consumer purchase goods and certain class of services are directly availed from the internet served by online retailers. Online retailers otherwise called as e-tailers. B2C can easily reach worldwide market with high volume of customers. Eg Amazon, ebay and paytm.

- Business to Business (B2B)
- B2B is the transactions between one business and another. The B2B web sites are not for the public, it is only available to business partners or suppliers and companies. Manufacturer and wholesaler. It is a cost reduction technique for the company so as to overcome mediator. Eg: Alibaba, walmart and indiamart.

- Consumer to Consumer (C2C)
- C2C is the business transaction between two consumers in selling goods over the internet either used or new products. Auction websites that helps a consumer to advertise and sell their product online to another consumer. Personal or used items are mainly transacted through C2C e-commerce. It
involves electronically facilitated transactions between consumers through some third party. It helps in online dealing of goods or services among people. Eg: Ebay, craigslist, quirk and OLX

- Mobile commerce

M-Commerce refers to the use of small mobile devices such as a mobile phone, a smartphone, to send and receive information about product sale. M-commerce is becoming popular, as every individual poses a mobile device connected to internet. Eg: esty and etc.

The main segment in E-commerce is B2C online market, where incredible volume of consumer products sale occurs. So B2C is biggest online market provide convenient and flexible shopping to its consumers. Apart from the easiness in e-commerce, there are many problems are challenged on the way of an online merchant[6]. Despite the recognition and the attention given to electronic business (or e-business) over the years, this type of business hasn’t yet achieved a desirable consumer satisfaction. This problem is emerging currently stated about product counterfeit in online commerce [7].

Today’s online market is growing tremendously yet it is going through a worst period of duplication. More duplicate products are in the market than their original one. Research says 70% of products were found out to be copy. The problem is not just whether cheated or not, it is whether users want to get cheated or not. Consumer is paying original amount for a duplicate product which feels embarrassed in E-commerce [8]. Nearly all products can be counterfeited. Examples include clothing, accessories, cosmetics, toys, medicines, medical devices, auto parts and etc. Many counterfeit goods are bought with full knowledge of their counterfeit nature, including sunglasses, CDs and handbags [9]. Counterfeit products cause harm in many ways. When counterfeit goods are purchased, individuals are put at risk of contaminated products, poisonous ingredients or malfunctioning parts. Even counterfeit pieces of apparel and a pair of sunglasses pose a threat by not performing to expectations, for example by not being wired correctly as claimed, or not blocking UV sunlight.

According to The Counterfeit Report [10], all over the world $ 1.7 trillion of counterfeit goods is in E-commerce market. Most of the counterfeit product sales were found in top E-commerce websites like Amazon.com Inc., eBay Inc. and Alibaba [11]. Based on the report, percentage of counterfeit product alert of some E-commerce websites are eBay 62%, Amazon 13%, Facebook 4%, Alibaba/AliExpress 4%, Walmart 1%, All Other Websites10% and Retail Stores 5%. CNBC reported in July 2015 [12], the counterfeit products in E-commerce is always a problem, Amazon’s stated that two dozen risk factors mentions potential liabilities associated with fraudulent or unlawful activities of sellers. If customers can verify that they’ve bought counterfeit goods, Amazon will push sellers to refund the purchase or they kick the sellers off the site. Merchants are not sure about whom or what may destroy their sales on a given day and how long it takes for hunting down fakers. It is very much important to verify the fake or counterfeit product in the E-commerce.

This paper addresses problem in identifying counterfeit products in E-commerce business. Organization of the paper is as follows, Section I is Introduction describes the basics of the core concepts, Section II Related work discusses previous works, Section III Problem Definition explains problem statement, Section IV Methodology exposes the methodology of the proposed work, Section V Objective says objective of the paper, Section VI Proposed Work details the proposed work, Section VII shows advantages of proposed work and Section VIII concludes the paper.

II. RELATED WORK

Finding the counterfeit product in online market is the big challenge to consumers in E-Commerce. This section discusses some of the existing works already done. John Wadleigh et al. [13] investigated the practice of websites selling counterfeit goods. They inspected web search results for 225 queries across 25 brands. They devised a binary classifier that predicts whether a given website is selling counterfeits by examining automatically extracted features such as WHOIS information, pricing and website content. When they apply the classifier to results collected between January and August 2014. They found that, overall, 32% of search results point to websites selling fakes. They found that brands with a higher street price for fakes have higher incidence of counterfeits in search results.

M. I. Akazue et al. [14] introduced a centralized merchant registration retrieval (CMRR) in e-commerce model. The paper highlighted how fake virtual stored is distinguished from legitimate virtual stores. Authors also identified the merchant location through the use of CMRR were discussed. Finally, questionnaire was distributed to customers who purchase goods and services online to evaluate the application of CMRR in distinguishing fakes virtual stores. Analysis of the data generated showed that CMRR can efficiently be used to distinguish fake virtual stores from authenticated and verified merchant stores.

Radwan M. Al-Dwairi et al. [15] attempted to propose a model for evaluating the quality of B2C e-commerce web sites using four main quality factors: security, privacy, design, and content. The proposed model can be easily implemented and may offer a high precession of quality prediction.

Tamilla Mavlanova et al. [16] proposed how counterfeiters use product presentation to manipulate signals that might otherwise identify a product as a fake and Web site trust signals to present themselves as legitimate business entities. An experiment demonstrated that advanced product presentation has a positive influence on user perceptions of the authenticity of products and increases user willingness to buy on-line. The absence of Web site trust signals provides significant evidence of the untruthfulness of a seller and decreases users' willingness to buy on-line.

Francesca Gino et al. [17] showed that wearing counterfeit products makes individuals feel less authentic and increases their likelihood of both behaving dishonestly and judging others as unethical. Authors have conducted four experiments...
that, participants wore purportedly fake or authentically branded products. Finally, showed that people do not predict the impact of counterfeits on ethicality; thus, the costs of counterfeits are deceptive.

Sulin Ba et al. [18] proposed a design of an economic incentive mechanism, the trusted third party (TTP), to serve the online auction communities using game theoretic approach. The proposed model addresses both the economic and technological aspects of online auction transactions by assigning a digital certificate to each participant. Thus, each participant's identity as well as his or her reputation can be established by other market participants. The analytical results demonstrate that when online transactions take place with the assistance of digital certificates issued by a TTP, the most utilitarian course of action for a market participant is to behave honestly.

Adrian Furnham et al. [19] presented a survey examined attitudes, beliefs and personality traits that account for the variability in people’s willingness to buy counterfeit products. The participants were 102 (44 males and 58 females). The questionnaire consisted of the Richins materialism scale, the Schwartz value inventory, questions about beliefs about counterfeit products and producers, as well as participant willingness to actually buy different counterfeit products. The results are discussed in terms of neglected area of research.

Peggy E et al. [20] presented a web-based survey of 254 students explored two ethical ideologies (idealism and relativism), collectivism, and two attitudes toward counterfeits (ethical concern and perceived quality) with respect to two counterfeit products (movies and pharmaceuticals) and reported respondents’ complicity in both a virtual and physical marketplace for each good. Consumer complicity – a consumer’s willingness to obtain, share, or use counterfeit products – was predicted by the consumers’ hedonic shopping experience and lack of ethical concern with two different counterfeit products.

Irena Vida [21] presented a study focused on the demand side of counterfeiting, examining consumer perceptions of non-deceptive counterfeiting in Slovenia, one of the most successful transitional economies among the new EU member countries. There have been reports indicating that the production of fake labels, decals and packaging has become a virtual cottage industry in some Central, Southern and Eastern European (CSEE) markets, with imported fake products from the Far East adding to the problem. While a wide range of products can be counterfeited, consumers knowingly engage in purchasing fakes particularly in some product categories such as luxury fashion items and computer software. In result, this research addressed various determinants of consumers’ attraction to lower priced counterfeits in three product-categories, two fashion-oriented products (a branded T-shirt and a watch), and an item of software. More specifically, consumers’ inclination to purchase these non-deceptive product counterfeits at various price levels relative to retail prices of genuine branded products are examined.

Many research works are going on in the field of E-commerce, specifically to address issue of verifying the original products in the E-Commerce. This paper proposes a method to authenticate the product as non-counterfeit.

III. PROBLEM DEFINITION

E-Commerce is adopted by all kinds of people in the world those who have knowledge about computer and internet. It is the easy way of shopping in online market. But, it has some issues in buying products. E-commerce consumers are often cheated by some online vendors those who promote fake or counterfeit products. The biggest problem in E-commerce is, difficult to find the fake or counterfeit in online shopping websites.

Every consumer in E-commerce definitely has an experience of cheated by counterfeit products. The counterfeit photo of original product posted in the online shopping websites with same as original product price. When consumer orders these kinds of counterfeit products, only at the time delivery they come to know that the product is counterfeited. Though E-commerce has provision for returning the product, it takes time for about 10 to 15 days to refund the money back to the consumer. Most of the E-commerce sites are not provided with proper return policies and services. Estimated counterfeit products in the economy make billion dollars of business per year, this economic condition not only create barriers for genuine product business but also reduce the revenue of e-commerce industry [9].

As we know there are several types of codes available for each and every product in the market. These codes help only at the time of billing the products. The codes are normally represented by a barcode system. Normally barcodes are used to know the identity but not authenticity [22]. Identity is a description of a product. The description is entered in a computer server and called up when the bar code is scanned. Bar code that describes a product details, but not the proof of authenticity. A counterfeiter can duplicate their product using the copy of this product bar code. Table 1 depicts different types of code used for product identity[23] [24] [25]. To avoid all these problems in E-commerce, a proper product verification system must be developed.

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<th>S.No</th>
<th>Code</th>
<th>Acronym</th>
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<tr>
<td>1</td>
<td>UPC</td>
<td>Universal Product Code</td>
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<td>2</td>
<td>EAN</td>
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<td>7</td>
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Hence, the counterfeit product sale in E-commerce must be inaccessible. Consumer must have awareness how to avoid fake products by clearly knowing whether the product is original or not. This paper proposes a novel approach to authenticate the original product using Original Product
Verification Code (OPVC). It is a unique code assigned to all products to verify whether the product is real or fake.

IV. METHODOLOGY
Day by day the consumption of online product is increasing tremendously. In order to ensure the consumers are buying the precise product as produced by the original producer, this paper proposes an Original Product Verification Code (OPVC) which is printed on every single product made by the producer to verify the same through a web or mobile application over the internet. The research implementation is going to develop an application for web and mobile. This application acts as an interface to authenticate the product based on OPVC code which is scanned or typed by the consumer at the time of product verification. The detailed process work flow of the proposed research work is depicted on methodological diagram in figure 1.

V. AIM AND OBJECTIVE
The main aim of the research work is to develop a unified architecture for verifying authentic product in E-commerce. The aim is achieved through following objectives,

- To propose a technique to find authenticity of products selling in E-commerce.
- To develop application for verifying product originality using OPV code.
- To develop a methodology for generating unique OPV code for each products.

This paper concentrate on first objective listed above and proposes technique to verify the originality of the product.

VI. PROPOSED WORK
The proposed technique is used to verify the originality of the product using a code. The paper introduces a unique code named Original Product Verifier Code (OPVC). This code is generated based on the details given by the manufacturer and product categories.

OPVC is a unique code for all individual products produced by the producer. OPVC not just used to find the identity of the product but also used to find the authenticity of the products. Authenticity describes the origin of the product and all details about the products. Once the product with a particular OPVC is sold to a consumer, then that OPVC is made invalidated. So, no single code is printed more than once on a product. The following steps describes the procedure of proposed technique,

Procedure of the Proposed Technique:-
1. Manufacturer submits their data for OPVC.
2. OPVC is generated for the manufacturer. Generated OPVC is only assigned to authentic manufacturer products.
3. OPVC is generated for a specific manufacturer is loaded in the database.
4. OPVC is not repeated to full quantity of a single product. Each piece of single product group has a unique OPVC.
5. After the production of products OPVC is printed on the cover of each and every product to show its originality.
6. Products with OPVC code is posted in the E-Commerce site with a photo of OPVC.
7. Consumers should verify this OPVC before placing an order to E-commerce site.
8. Consumer uses their mobile device to verify the OPVC using web application.
9. Application verifies the authenticity of the product from the database and replies to consumer with details about the product.
10. Each attempt of verification is recorded in the database with GPS location of mobile device.
11. If counterfeit product is triggered with a wrong OPVC then immediate alert message is sent to corresponding manufacturer.
12. Manufacturer takes necessary action to prevent the counterfeit product from E-commerce site.

OPVC is generated by a code generation algorithm. This is an obfuscation algorithm [26], it uses inputs from user data and generates code based on the users requirement.

![Methodological Diagram of Proposed Work](image)
6.1. Format of OPVC

OPVC is a unique code generated for each products produced in world. It is a 16 digit alpha numeric code. This code is generated based on the details given by the manufacturer. From various details of manufacturer, data are extracted randomly and these data are given to the code generation algorithm to generate the OPVC code. OPVC code acts as an authentication code of a product, because this code is used to authenticate the particular product of the organization. Code generation algorithm generates the OPVC by using different mathematical functions and programming logics. This algorithm generates unique code for each organization, because it gets input from product organization and randomly manipulates the data to produce the OPVC. OPVC contains mixer of numerical and non-numerical characters. To strength the uniqueness of the code, Code generation algorithm is literally modified to include special symbol in OPVC. Symbols in OPVC improve the authenticity of the product and it is not easily hacked by any counterfeiter. Counterfeiter could not copy this code, because, it is a unique code for each piece of products. Once the product is sold then that particular code is deactivated. Now if deactivated code is used again by counterfeiter then it is easily identified by the application.

II. ADVANTAGES OF PROPOSED WORK

The proposed work gives many advantages to consumers as well as product manufacturers.
1. It is used to authenticate the E-commerce products
2. Improves the revenue to the original product manufacturer
3. OPVC code assigned to single piece of product and not repeated to other products
4. Deactivated once the product is sold
5. Helps to avoid duplication in E-commerce products
6. OPVC cannot be fake
7. Real time application for verifying the Product

VIII. CONCLUSION

In today’s digital marketing world, e-commerce plays a vital role in buying behavior of consumers. The e-commerce industry is growing at a remarkable pace due to high penetration of internet and sophisticated electronic devices. There are many problems and challenges on the way of an online merchant. Factor like product duplication is the biggest challenges to overcome in online industry. The proposed technique addressed the problem to reduce fake products in E-commerce websites. The work introduced an Original Product Verification Code (OPVC) to verify the authenticity of the products in E-commerce. It is a unique code assigned to each product and it cannot be copied to any counterfeit product. The proposed technique is more efficient to find the fake or counterfeit products in the E-commerce. In future, OPVC code can be implemented with special symbol.

REFERENCES


