QUALITY IMPROVEMENT OF CIVIL ENGGINERING PRODUCTS USING HELPFUL REVIEWS FROM SOCIAL MEDIA

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ABSTRACT

The social media sites are a source of content of customer experiences based on Product usage (the best and the worst) with details covering preferences, expectations and a variety of candid product feedbacks resulting in User Generated Content (UGC). This vast user generated content of product reviews and comments which when utilized can provide meaningful insights and information to improve product quality across industries and a competitive advantage in the product market segment. This study aims to explain the importance and the effective source of meaningful reviews from social sites which help product quality improvements. This research is based on secondary data that shows the relationship available between helpful review comments and product quality management aspects. The findings from the existing literature review concludes that user generated content from social sites appeal and when innovative technological solutions applied help product quality improvement effectively.

Keywords: Quality Improvements of Civil Engg Products using Reviews, Use of Social reviews for Product Quality, Quality improvements of Products using User Generated Feedbacks, Social Media based contents for Quality Enhancements

Cite this Article: G. Vikram and Dr. F.J. Peter Kumar, Quality Improvement of Civil Engginering Products using Helpful Reviews from Social Media, International Journal of Civil Engineering and Technology, 9(10), 2018, pp. 242–252.

http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=9&IType=10
1. INTRODUCTION
Social media is defined as a set of online tools which help registered users to build relations through interaction and to create, share and edit contents (Mount & Martinez 2014). Kaplan and Haenlein (2010) have defined social media as “a group of Internet based applications that build on the ideological and technological foundations of Web 2.0, and allow the creation and exchange of user generated content.” With the context of exchange of content, there are a variety of social media platforms / applications exists such as Facebook, LinkedIn, Flickr, Youtube, Wiki, Podcasts, etc which allow user to share contents in an array of formats such as text, image, audio, video, links and photographs.

According to Naylor, Lamberton, and West, by 2011 approximately 83% of Fortune 500 companies were using some form of social media to connect with consumers. As Kumar and Bhagwat (2010, p. 16) point out, “Social media enables firms to acquire knowledge similar to that of expensive focus groups, but at a fraction of the cost in mass numbers”. With digital & technology being the trend across industrial segments, the social media has become one of the key tenets for any business strategy.

In order to succeed and sustain in any market segment of business proper networking is a must (Kelley et. al 2010). With the availability of end users over social media, the boundary of interaction had widened and the consumer network gets converged to share inputs over social media for attention of product development teams. Mangold & Faulds (2009) have stated that customers look to social media tools for product related details and feedbacks for purchase decisions and therefore, coordination between businesses and their respective customers and future plans must be consistent.

This study focuses on analyzing how user generated contents such as reviews, comments and feedbacks has an impact on product quality improvements and incremental product development strategies.

1.1. TREND OF SOCIAL MEDIA IN MARKET PERSPECTIVE IN INDIA
The key trends that have put India in the social media spotlight:

- Social Networks penetration based Statista report shows the number of social network users in India is estimated around 258.27 million users in 2019, up from close to 168 million in 2016
- The most popular social networks in India were YouTube and Facebook, followed by social app WhatsApp. Facebook is projected to reach close to 319 million users in in India by 2021.
- Growing popularity of social media: Active social media users grew at 15 per cent since January 2015 to 136 million in 2016.
- Digital spending trend: Digital Ad spending grew to around 47.5 per cent in 2016, in comparison with the overall Ad spending, which was pegged at 15.5 per cent in 2016
- Trend of profile pages for Organizations – Each organization has gained a space in Social network sites and each organization retain pages specific to products & services and related applications related to them. Example Facebook Page, Twitter Page and LinkedIn Page across geographies for Civil Engineering Industries, Retail Companies, Books and Electronic products.
- Regalix Research, a consulting organization that guide marketing strategy development and execution shared few insights based on their recent survey [M Social Media Trends in India 2017] conducted among an age group of 18-44 as:
More 25-34 year olds (74%) used social media in their purchase decisions than the 18-24 olds (58%).

89% of respondents said they followed their favorite brands on social media thru technology devices – mobiles / gadgets. When asked why, 40% said it was for ‘discounts’, while 38% said it was for ‘new product information’.

Majority of respondents (86%) admitted to clicking on ads that appear on social media when accessed thru mobile phones; only 14% said they didn’t.

2. LITERATURE REVIEW ON USE OF HELPFUL REVIEWS FROM SOCIAL MEDIA FOR PRODUCT QUALITY IMPROVEMENTS

Prahalad and Ramaswamy (2000) observed that the role of the customer has evolved from a passive audience to active player.

Based on work by Porter et al., (2011) and Kietzmann et al., (2011); Social media - a technology with a set of online and mobile environments focused fundamentally on interactivity, allowing discussion between the stakeholders, with one another and with the company. The key inputs, information and feedbacks from customers or end users are to be examined and evaluated for enrichment of business needs; where internal communication plays a key role. The external public perceives the employees as true ambassadors of the company and thus feedback takes on a major role in building its reputation (Banuta, 2011).

Based on the work by Berendsen, G. et al. (2015), social media is identified as an efficient and convenient tool to handle customer communication for quality improvements, new / incremental product development processes across stages especially at large numbers using segmented forums depending on organization goals and needs.

Nambisan (2002) and Glessner (2012) argue that engaging customers in product development increases the probability of breakthrough ideas. O’Connor (1998) finds that customers play an important role in providing input for incremental product developments, Quality refinements and less so in more radical innovations.

N Barkoczi et.al (2016) reveals that consumers are more conscious about quality and features of products supporting their daily needs. It is very important that manufacturers develop and market a competitive product to satisfy customers.

Product Quality improvements to support consumer needs need timely and accurate product quality feedback (Ji et al. 2014). Of all product-quality feedback information, customer feedback is the most effective and valuable for product quality improvement (Li et al. 2014). In recent years, social media outlets and tools such as Blogger and forums have been undergoing rapid development (Liu et al. 2015);

From the marketing perspective, online product reviews can be a valuable tool for promoting products, collecting consumer feedback and boosting sales (Chu & Roh, 2014). As these studies show, there is a direct relationship between product ratings and sales. For example, online movie reviews and ratings significantly correlate with box office revenues (Liu, 2006), and online book reviews positively affect book sales (Chevalier & Mayzlin, 2006).

Product Quality is a continuous process of product quality improvements to support consumer needs. Dell’s IdeaStorm, a social media innovation hub, was a bold move where customers suggested ways the company could improve products, features and support. This represents the usage of Social Media for collaborative creation and customer’s suggestions were heard for Quality improvements. In its five-year-tenure, IdeaStorm has received nearly
15,000 suggestions and has made about 500 refinements based on them which created a positive impact on Dell laptop sales. Therefore, there is a positive association between customers and Product development strategies and Quality products that satisfies customers.

Based on McKinsey Survey (Oct 2011), the use of social technologies is now an implied mandate for organizations to adopt to business model that should integrate environmental, social, and governance issues into their business model and act on them considering the potential of social economy.

3. THE BUSINESS VALUE TO ORGANIZATIONS
With the technology advancement and digital trends, product related information’s are shared easily across customer base quickly over social network sites and thru word-of-mouth interactions. With this consumer reach over social media and growth of technology, product related feedbacks are of great importance to any production unit. Product feedbacks can be costly to corporations for a number of reasons namely customer dissatisfaction, product losing to competition, drop in sales, brand reputation damage, etc in major industries like civil engineering & establishments, civil construction materials, retail consumer goods, automobile industry and others. Product quality covers both performance and conformance attributes of the product, and is an important aspect of enterprise competitive advantage.

J. Gerdes, et. al (2008) discusses that to gain a better understanding of products launched, effective firms must gather product-relevant information both internally and externally on the issues affecting their products, with an objective to improve and act upon for better sales.

Abrahams et al. (2013) reveals that social media helps customers express their opinions freely and the feedback information reflects product quality, customer behaviors and customer preferences, which have tremendous commercial value. Thus, quality managers can work on helpful quality-related reviews to make more effective production system and product quality improvement. In addition to product related issues / concerns and feedback, the social media also opens the opportunity of product-related ideas providing specific guidelines for incremental / new product development from the perspective of customers. Secondly, reviews with respect to product comparisons among the product segments, can also benefit product marketing.

Based on empirical study and analysis, Rodrigo Guesalaga (2015) work states organizational competence and product quality commitment to identify, interact and promote social customers can help for sales motives and benefits. HubSpot focuses on social media in solving customers’ problems as a way to earn leads. The support and quality improvements were giving customers a taste of ‘results in advance’ and potentially earned brand boost with rebuying potential and new customers in their sales journey.

Civil Engineering Industry: The recent trend in Civil Engineering constructions are to bring quality products during construction (supporting changing climate, environment friendly) like cement, sand, paints, adhesives, white cement, supporting tools and floor tiles are gaining more attention for better finishing and life time support. Many a products are now available online and are a click away for purchase. Using the helpful reviews from social media, the civil engineering companies can boost their product quality suitable for emerging trends and enable for better construction strategies.

Retail & Consumer Goods Industry: The day life of human race is liaising with many a consumer goods and are introduced in variety from different brands across globe where quality is highly inevitable for consumption. The uses of home appliances, electronic goods,
stationaries, etc are good examples. The consumers based input and feedbacks are a major contribution for brand positioning and quality improvements in a competitive market.

4. OBJECTIVES OF THE STUDY
- To know on the technology aspects and the impact of product feedbacks for quality improvements
- To identify the dimensions supporting Use of Social media for product quality improvements
- To explore the impact and relationship of product feedbacks on incremental / new product development strategy across the lifecycle

5. RESEARCH METHODOLOGY
This research is based on secondary data. The study is based on various research articles from reputed journals and the details collected from different sources are discussed in the literature review.

All the secondary data was collected and obtained from reputed management journals from different data bases and web sources.

6. HELPFUL REVIEWS FOR PRODUCT QUALITY IMPROVEMENTS – PUBLISHED MODELS

6.1. INTEGRATED TEXT ANALYTIC FRAMEWORK
With the emergence of Social network sites capabilities, enterprises create campaigns and product pages to boost their brand and sales. This helps for customer engagement and address issues / concerns raised by different from different social channels. Abrahams et al. (2014); based on their work created an Integrated Text Analytic framework to quantify the social data and extract important features from postings which can later be used to discover and analyze product defects.

The study was performed on vehicle and consumer electronic goods where the framework design covers the possible seven categories [lexical, stylistic, social, sentiment, distinctive terms, product features and semantic cues] of input cues or features which can be extracted from user postings in predicting product defects. The entire process was referred as text mining or text analytics where techniques such as linguistic analysis and information retrieval are used to build exploratory and predictive models to uncover product defects.
The framework helped automated defect discovery and even small defects helped for reducing / arresting defective unit’s sales. This defect discovery tool helped to improve quality and reduce associated costs where necessary expertise is involved for implementation. The model was applicable for high sales volume products plus which can generate sufficient social data for analysis. The framework also recommended manual reviews as applicable on suspected cases of defects identified.

6.2. HQRM MODEL
Abrahams et al. (2014) and Krishnamoorthy (2015) studies revealed that any deep analysis of social media data can lead to only 2 classes of reviews namely helpful and unhelpful. The advancement of technology and social network site features has powered the customers and Product end users to add review comments / feedbacks in different formats and styles such as texts, icons, images, graphical contents, visual contents, blogs and comparison charts.

Figure 1 Integrated Text Analytic Framework

Figure 2 HQRM Model
Based on the recent work of C. Jiang et al. (2017), revealed the below key outcomes:

- The helpful reviews can be classified into multiple classes attributing to different aspects of quality for product improvements and production systems too.

- The study highlights a multi-class classification of reviews based on features (linguistic, sentiment, social, distinctive) supporting unstructured data pool for unhelpful and helpful comments. The classifications analyze the helpful comments and are classified into 3 categories [product-defect-related reviews, product-comparison-related reviews and product-idea-related reviews] to support different levels of quality.

Examples of helpful review comments as below:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Product-defect-related review</th>
<th>Product-comparison-related reviews</th>
<th>Product-idea-related reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engg Products &amp; Establishments</td>
<td>M-Sand consumes more water and takes more time to get set once flooring are done</td>
<td>The M-Sand offered today doesn’t guarantee the right strength for concrete as natural sand</td>
<td>Prefer M-Sand offered with mix of ingredients for effective concrete</td>
</tr>
<tr>
<td></td>
<td>The Asian paints exterior paints color fades on climate change in short time span.</td>
<td>The online purchase of (choose and pick) Asian Paints was trendy but lacks the expected variety as in Tractor Emulsion paints.</td>
<td>The interior paints from Asian Paints can be supported with supporting manual for effective usage on different walls.</td>
</tr>
<tr>
<td>Retail Consumer Goods</td>
<td>The Samsung android mobile phone batteries doesn’t last enough longer for daily usage</td>
<td>The Samsung launches new models very often but prefer Mi Phones due to latest configurations of internal (processor, OS and RAM) components</td>
<td>Prefer the Samsung with latest processors and RAM, secured locking facilities</td>
</tr>
<tr>
<td>Automobile Industry</td>
<td>The Skoda shows transmission jitter at idle speed and make a lot of noise</td>
<td>The Skoda has a very pleasant interior but prefer Audi for its prettier appearance and better suspension</td>
<td>Prefer the Skoda to provide high mileage &amp; upgrade to 18-inches wheel with camera assistance for parking</td>
</tr>
</tbody>
</table>

- The study offered the HQRM model which helps analyze the multi-class characteristics and imbalanced data distribution of unhelpful and helpful reviews covering only the 4 features using algorithms (KNN, Naïve Bayes etc) supporting 3 learning models namely cost-effective learning, ensemble learning and kernel classification.

- The outcome revealed that the model offers improved performance in classification performance and can reduce the labor cost in classification for quality management practices.

7. TECHNOLOGY IMPACT ON USER GENERATED CONTENTS FROM SOCIAL MEDIA

In the current digital trend, social network sites offer flexibility in creating comments in a variety of formats (data) and gains velocity and volume in a short duration and are to be analyzed for deriving meaningful insights.

The existing models are supporting only a feature based study for product insights targeting specific industries whereas the opportunity for Quality Improvements can be accomplished all through the product lifecycle for optimized Cost of Quality. Considering the advancement and development of technology such as Artificial Intelligence (AI), Natural Language Processing (NLP), Machine Learning (ML), Advanced Algorithms are available...
and has an impact in the way the user generated content (unstructured data) can be extracted, processed, analyzed and synthesized for insights to improve product quality and production systems supporting business needs.

Therefore, the contributions of innovative technology solutions for social data analysis will influence and support the product quality improvements throughout the lifecycle and for production strategies supporting enterprise needs.

8. SUGGESTIONS
Suggestions are to focus on:

- Explore and develop the factors that influence social media contents for product quality improvement and production systems positively considering quality drives sales and boost brand equity across industries
- Develop Innovative technology based solutions for advanced analysis of user generated content to derive meaningful insights for product development strategies across industries

9. DIMENSIONS – USE OF CUSTOMER REVIEWS FROM SOCIAL MEDIA FOR PRODUCT QUALITY IMPROVEMENTS
Based on the reviews of various research articles from standard journals, the dimensions are identified which can help for providing insights from social media on product quality improvements across industries supporting the product lifecycle & strategy.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
<th>Supporting Publications</th>
</tr>
</thead>
</table>
| Social Product Development Strategy | A product development framework used for the development of products or services in various stages of the product development life cycle. | SOCIAL PRODUCT DEVELOPMENT: INTRODUCTION, OVERVIEW, AND CURRENT STATUS -2014 Anna Peterson and Dirk Schaefer
USE OF SOCIAL MEDIA APPLICATIONS FOR SUPPORTING NEW PRODUCT DEVELOPMENT PROCESSES IN MULTINATIONAL CORPORATIONS -2017 NaheedBashir, K. NadiaPapamichail, KhaleelMalik
SOCIAL MEDIA BASED VALUE CREATION AND BUSINESS MODELS –2016 SannaKetonen-Oksi, JariJuhaniJussila, HannuKärkkäinen |
| Democratic Social Design | The process of consumer controlled product design, where consumers inputs & feedbacks are used to validate / re-align ending up with efficient design supporting product development | DEMOCRACY IN PRODUCT DESIGN: CONSUMER PARTICIPATION AND DIFFERENTIATION STRATEGIES -2015 ZsoltKatona1
DESIGN-ORIENTED NEW PRODCT DEVELOPMENT -2009 SeongkeunJang, YongkiYoon, InseongLee, and JinwooKim
SOCIAL MEDIA AND WEB 2.0 FOR KNOWLEDGE SHARING IN PRODUCT DESIGN -2017 ZahirIrani, Amir M. Sharif, ThanosPapadopoulos & Peter E. D. Love |
| Cross Functional Teams | Cross Functional teams are used within any organization (supported by Org Structure) to study, analyze, develop and implement a product development based on specifications | NEW PRODUCT QUALITY AND PRODUCT DEVELOPMENT TEAMS -2000 Rajesh Sethi
SUCCESS FACTORS FOR QUALITY IN PRODUCT DEVELOPMENT –2014 |
<table>
<thead>
<tr>
<th>Information &amp; Knowledge Integration</th>
<th>USE OF SOCIAL MEDIA APPLICATIONS FOR SUPPORTING NEW PRODUCT DEVELOPMENT PROCESSES IN MULTINATIONAL CORPORATIONS -2017 NaheedBashir, K.NadiaPapamichail, KhaleelMalik</th>
</tr>
</thead>
<tbody>
<tr>
<td>The process of constant feed of sensitive social details (internal to Organization) both qualitatively and quantitatively helps cross functional teams supporting product development covering quality aspects @ stages of PLM with effective knowledge / expertise.</td>
<td>SUCCESS FACTORS FOR QUALITY IN PRODUCT DEVELOPMENT –2014 Dev Sajjan, Henrik Petersson</td>
</tr>
<tr>
<td>Social Quality Data</td>
<td>LEVERAGING SOCIAL NETWORK SITES IN NEW PRODUCT DEVELOPMENT - OPPURTUNITY OR HYPE -2014 A:Deborah L. Roberts and Marina Candi</td>
</tr>
<tr>
<td>The process of accurate, timely and reliable feed of credible social details exchange (with ease) supporting product quality needs @ stages of PLM.</td>
<td>CAPTURING HELPFUL REVIEWS FROM SOCIAL MEDIA FOR PRODUCT QUALITY IMPROVEMENT: A MULTI-CLASS CLASSIFICATION APPROACH – 2017 Cuiqing Jiang, Yao Liu, Yong Ding, Kun Liang &amp; Rui Duan</td>
</tr>
<tr>
<td>Social Intelligence</td>
<td>THE VALUE OF SOCIAL MEDIA FOR SMALL BUSINESSES -2013 Ludwig Christian Schaupp</td>
</tr>
<tr>
<td>The regular time based (using NLP, AI-ML, algorithms) analysis of product comments and competitor landscape products for quality non-compliance / customer preferences (features, standards, performance &amp; conformance) to support PLM</td>
<td>CAPTURING HELPFUL REVIEWS FROM SOCIAL MEDIA FOR PRODUCT QUALITY IMPROVEMENT: A MULTI-CLASS CLASSIFICATION APPROACH – 2017 Cuiqing Jiang, Yao Liu, Yong Ding, Kun Liang &amp; Rui Duan</td>
</tr>
<tr>
<td>Quality Policy</td>
<td>DOES INTENSIVE SOCIAL NETWORK MANAGEMENT LEAD TO POSITIVE EFFECTS IN QUALITY PRACTICES? -2016 Bagur-Femenías, Llorenç.Perramon, Jordi.Barquero, José Daniel</td>
</tr>
<tr>
<td>The Quality Policy created with the Customer Requirements in mind, where quality objectives are linked back to the Customer Requirements covering very channel (Forums, Support Teams, Social Media) of customer interaction</td>
<td>COST OF QUALITY: EVALUATING COST-QUALITY TRADE-OFFS FOR INSPECTION STRATEGIES OF MANUFACTURING PROCESSES –2017 Muhammad Arsalan Farooq, Henriqueta Nóvoa</td>
</tr>
<tr>
<td>Cost Of Quality (CoQ)</td>
<td>CoQis the cost incurred in the design, implementation, operation and maintenance of an organization's quality management system for the product lines</td>
</tr>
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</table>

10. CONCLUSIONS
Based on the study and analysis on various author publications and descriptions it was clearly illustrated that user generated contents from social sites play a very important role in product quality improvements and product development strategies. The key factors such as helpful review comments (data), technology, innovative solutions can contribute and stand as a vital need for product quality improvement insights. In general, the market needs a unique solution to analyze the social contents to influence and guide the product quality improvements and product development strategies across industries considering all the features and factors of a product – a scope for future study.
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Websites

