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Integrating websites with social media – An approach for group decision support

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Today, integration with social media plays a key role in meeting the marketing objectives of many businesses which are leveraging the power of the web. However, for a business, integration of the website with the social media provides ample challenges in formulating an operational strategy. In this study, the application of an integrated approach for group decision-making is presented for meeting this objective. In the first stage, the key social media channels which are important for the specific context have been identified by a group of decision-makers in consensus, using the Delphi method. Subsequently, the decision support approach prioritises and aggregates the collective priorities of multiple decision-makers by integrating fuzzy set theory and analytic hierarchy process for group decision-making under consensus. A case study was conducted on a web-based portal for content publishing, namely Business Fundas, for selecting a suitable yet comprehensive solution for social media integration.

Keywords: social media; group decision-making; analytic hierarchy process; Delphi method; fuzzy set theory

1. Introduction

Today, social media channels are transforming the way enterprises are leveraging the power of the web. Increasingly, marketers feel that traditional channels of communication need to be complemented by digital channels which can leverage the power of the social media (Eyrich, Padman, & Sweetser, 2008). In fact, social media is increasingly affecting decision-making throughout multiple levels within organisations (Power & Phillips-Wren, 2011). However, for a web-based venture, integration of the website with the social media platforms provides ample challenges in terms of choosing the best possible method for such integration. There are numerous plugins for every content management system which may be used for creating such a website, and choosing a comprehensive yet customizable solution based on the requirements of a website presents immense challenges for decision-makers. For example, as of November 2013, Wordpress and Joomla have 585 and 246 plugins, respectively, for social media integration. Thus, even if a website uses one of these content management systems, choosing the right tool for social media integration becomes a tough choice for the decision-maker. No study has yet attempted to address this specific need, using a decision support system for group decision-making, which can leverage the collective intelligence of a group of decision-makers in consensus.

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In this study, the application of a group decision support system has been presented for integration of a web-based knowledge portal with social media platforms. A group of decision-makers in consensus offers higher reliability and regularity in the outcome, even when they are collectively focussing on the same problem, as compared to individual decision-making (Kar & Pani, 2014a; Zaraté & Soubie, 2004). In the first stage, the group of decision-makers identifies the critical criteria for evaluating the available tools, following a Delphi methodology. In the subsequent stage, the group of decision-makers prioritises and aggregates multiple dimensions of a few platforms, from the users’ perspective, by integrating fuzzy set theory (FST) and analytic hierarchy process (AHP) for group decision-making. Subsequently the collective priority developed under consensus is mapped to the performances of multiple tools selected for social media integration. The proposed integrated approach for group decision-making under consensus has been tested for practical applicability on a web-based knowledge portal, namely Business Fundas (http://business-fundas.com). Business Fundas was developed using the Wordpress content management platform, which powers over 60 million websites and is the most popular platform being used (Wikipedia, http://en.wikipedia.org/wiki/WordPress). While Wordpress has over 750 listed tools for social media integration, as of September 2014, the hybrid approach for group decision-making has been used to select the most suitable tool from among this large list of potential solutions.

2. Review of related literature

2.1. Impact of social media

Today, integrated marketing communications is the guiding principle organisations follow to communicate with their target markets, and this depends extensively on the degree to which effective social media management strategies have been adopted by the firm (Mangold & Faulds, 2009). Today, significant effort and resources are deployed in managing social media, since social media constitute a substantial part of the organic search results, indicating that search engines likely direct potential customers to social media sites and sites with high social media integration (Xiang & Gretzel, 2010). This would again result in higher returns on marketing from resource deployment. However, the challenge lies in identifying the suitable social media channel and using a suitable tool to integrate communications with it. The world of Web 2.0 is too vast to focus on all the channels and, based on the focus of the business need, the receptivity of the channel for communication always differs. Also, evidence has been presented in the social media literature that there is a strong relationship of the information type with the complexity of the task and the success of the information sources (Bystrom, 2002).

Social media creates context-specific value for organisations through efficiency and novelty of usage as well as lock-in and complementarities (Nagle & Pope, in press). Thus, context specificity of utilisation is an important dimension in the value creation process. In this study, we have focused on content-publishing Web 2.0 websites. Content-publishing platforms like blogs and content communities have a very high need to enhance visibility on the web (Kaplan & Haenlein, 2010). The major sources of revenue for such content-publishing websites are based on the traffic they manage to attract from different sources. Social sharing of links to articles posted on such websites to enhance visibility across social media websites enhances web traffic and even crowd-sourcing in content generation (Halvey & Keane, 2007). This social sharing of the links to published content becomes even more critical in the wake of improving results in organic searches through search engine optimization (Davis, 2006). However, there is not a significant literature on
how these content-publishing websites could be seamlessly integrated with social media platforms. Further, social media channels for communicating with the target audience can be classified under the following categories (Mangold & Faulds, 2009): social networking sites (e.g. Facebook), creativity/multimedia sharing sites (e.g. Flickr), intellectual property-related sites (Creative Commons), user-sponsored websites (e.g. Cnet.com), company-sponsored websites (e.g. Procter and Gamble’s (P&G) Vocalpoint), company-sponsored causes/help sites (e.g. click2quit.com), business networking sites (e.g. LinkedIn), collaborative websites (e.g. Wikipedia), commerce communities (e.g. eBay), podcasts (e.g. This American Life), news delivery sites (e.g. British Broadcasting Corporation (BBC)), educational materials sharing (e.g. Massachusetts Institute of Technology (MIT) OpenCourseWare), open-source software communities (e.g. linux.org) and social bookmarking (e.g. Digg, Reddit). With so many channels, the first step is to identify the relevant channels for a specific context. Subsequently, the next step is to select a suitable tool which will facilitate the communication with these channels as required. While frameworks have been proposed for user collaboration using social media (Meredith & O’Donnell, 2011), there has been little exploration of the approaches which can facilitate integration with such channels. These gaps in the existing literature are filled in this study using the Delphi methodology and the fuzzy AHP for group decision-making.

2.2. Decision support literature on group decision-making

It has been established that for complex processes, the collective intelligence of a group of decision-makers in consensus is often more effective than the same decision-makers working in isolation, even for the same prioritisation problem (Kerr & Tindale, 2004; Zaraté & Soubie, 2004). Using a decision support system for group decision-making leads to the reconciliation of extreme preferences (e.g. from personal bias) and enhances the satisfaction of participating members in the outcome of the decision-making process due to improved information-sharing and a reduction in minority influence (Rao & Jarvenpaa, 1991; Watson et al., 1988). Further, for complex multi-criteria decision-making problems involving prioritisation among alternatives, group decision-making under consensus facilitates greater consistency in ranking among alternatives as well as greater reliability in the prioritisation of alternatives (Kar, 2014a; Kar & Pani, 2014a, Kar & Pani, 2014b). However, there has been only one study which has attempted to explore the applicability of decision support theories for group decision-making in the domain of social media integration for content-publishing websites. Kar (2014b) used the AHP to select the most suitable tool for social integration, although theories of consensus achievement were not explored in this study. It is important to note that consensus achievement is a key dimension for evaluating success in group decision-making (Dong et al., 2010; Kerr & Tindale, 2004).

Group decision-making has been extensively explored using decision support methods while focusing on objectives like selection, ordering and ranking, and structuring and measuring within a focused problem domain (Peniwati, 2007). Different decision support approaches to address group decision-making have been discussed in the literature. Some such popular methods are the outranking models (Tavares, 2012), the Delphi method (Okoli & Pawlowski, 2004), evolutionary systems (Checroun, George, & Shakun, 1994), multi-attribute theories (Pang & Liang, 2012; Wei, 2010), analytic network process (Levy & Taji, 2007), The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) (Chen & Lee, 2010; Shih et al., 2007; Tan, 2011; Yue, 2011), preference distance-based approaches (Tapia Garcia et al., 2012; Yue, 2011),
multi-stage approaches (Silver, 1995), spatial approaches (Andrienko, Andrienko, & Jankowski, 2003) and different multi-valued logic based approaches (Chen, Wang, & Lu, 2011; Chen et al., 2012; Wang & Li, 2012; Zhang & Liu, 2011), to name a few. AHP is another well-developed approach for providing group decision support, and was used in this study. It is one of the most suitable methodologies for group decision-making since it has extensive theories for priority estimation, priority correction, priority aggregation and consensus development (Kar 2014b; Kar & Pani 2014a; Peniwati, 2007). Details regarding how the fuzzy extension of the AHP for group decision-making is more suitable for the specific problem domain are elaborated later, in the section detailing the computational methodology.

3. Contribution

A review of the literature on social media highlights the need for integrated marketing communication for marketing and reaching out to the target segment. However, not many studies focus on the decision support aspect of managing social media channels, or choosing the right way to manage such an initiative. While Kar (2014b) has used the AHP for social integration, the applicability of the theories of consensus achievement was not explored in Kar’s study. It is important to note that consensus achievement is a key dimension for evaluating success in group decision-making, and has been addressed in our study in the analysis of both the Delphi method and with the fuzzy AHP for group decision-making.

Our investigation highlights that as of December 2013, Wordpress has over 750 open-source tools for social media integration. Thus, if a website uses the Wordpress content management system, choosing the right tool for social media integration becomes a tough choice for the decision-maker. Considering that there are over 60 million websites using Wordpress, the approach would benefit many of these websites which would need integration with social media channels. In fact, there has been no study which has attempted to address this specific need using theories of consensus achievement, using a decision support system for group decision-making, which can leverage the collective intelligence of a group of decision-makers in consensus.

In this study, an approach has been proposed which integrates two well-developed methods and theories for group decision-making for structuring a decision-making process. The proposed approach has been applied in a real-life case study. The first stage is selecting the important dimensions for evaluating the success of the outcome, i.e., the social media channels which should be considered for a given context. The next stage is investigating the competencies of the listed available tools in the context of these evaluation dimensions, in a structured manner. The first stage has been addressed in the problem using the Delphi methodology. The second stage has been addressed using the fuzzy extension of the AHP for group decision-making. Then, using a sum–product approach, multiple tools have been ranked based on their context-specific suitability. Through this integrated approach, finally, the most suitable tool for social media integration has been chosen for a content-publishing website.

4. The computational approach

The study has taken the approach of using two methodologies for group decision-making, namely the Delphi methodology and the fuzzy extension of the AHP for group decision-making. A detailed step-wise description of the computational approach is elaborated subsequently.
4.1. The Delphi methodology

The Delphi methodology, developed by Dalkey and Helmer (1963), has been widely used to obtain group consensus among domain experts. More specifically, it is a methodology for eliciting consensus in group decision in an iterative manner from a panel of experts on a particular problem domain, and experts are encouraged to revise their earlier decisions in light of the anonymous responses of other experts on the panel, in subsequent iterations (Hwang & Lin, 1987; Khorramshahgol & Moustakis, 1988). Most Delphi studies (Hsu & Sandford, 2007), have a sample size of five to 20 domain experts as respondents, and two iterations are often sufficient to achieve consensus in group decision-making. Consensus can be obtained in a number of ways, including having over 80% of the votes classified to two distinct categories (Ulschak, 1983). Further, Green (1982) establishes that at least 70% of Delphi participants need to rate 3 or higher on a 4-point Likert-type scale, and the median has to be at 3.25 or higher for the achievement of consensus.

There have been many studies which have used Delphi for achieving consensus among a group of experts, in domains involving selection among alternatives involving technology and social media (e.g. Kenis & Bollaert, 1992; Linke & Zerfass, 2012). In this study, the major social media channels which would be relevant in the given context have been identified using the Delphi methodology. After the identification of these channels, the channel-specific competency was evaluated for all the potential tools for the selection process.

4.2. The fuzzy extension of the analytic hierarchy process

The AHP (Aguarón & Moreno-Jiménez, 2003; Saaty, 1980) was developed for use in multi-hierarchical, multi-criteria decision-making problems. It decomposes the problem into a hierarchy of more easily comprehended sub-problems, each of which can be analysed independently through comparative independent judgments made by expert decision-makers. AHP is extremely suitable for group decision-making, for specific reasons. Firstly, AHP has appropriate theories to estimate the consistency of the priorities of the decision-makers (Aguaron, Escobar & Moreno-Jimenez, 2003; Aguarón & Moreno-Jiménez, 2003; Saaty, 1980). Secondly, there are systemic approaches to improve the consistency of priorities (Cao, Leung, & Law, 2008; Finan & Hurley, 1997; Xu & Wei, 1999). Thirdly, it provides different methods for the aggregation of group preferences (Beynon, 2005; Bolloju, 2001; Condon, Golden & Wasil, 2003; Dyer & Forman, 1992; Escobar & Moreno-Jiménez, 2007; Forman & Peniwati, 1998; Honert & Lootsma, 1997). Also, there are robust theories for consensus building within groups (Bryson, 1996; Dong, Zhang, Hong, & Xu, 2010; Escobar, Aguarón, & Moreno-Jiménez, 2004; Moreno-Jiménez, Aguarón, & Escobar, 2008; Wu & Xu, 2012). To the best of our knowledge, the application of these theories for group decision-making has yet to be explored for tool selection for social media integration.

The prioritisation of these channels obtained from Delphi, and the prioritisation of the tools based on competency on these channels, is addressed through an integrated approach using FST and AHP. Inclusion of FST accommodates the subjectivity in the human decision-making process for complex problems. In this approach, first the linguistic judgments of users are captured and mapped to quantifiable fuzzy judgments. Subsequently, these fuzzy linguistic judgments are converted to crisp priorities using AHP theory.
Let $U = (u_1, \ldots, u_n)$ be the set of $n$ users having a relative importance of $\psi_i$ such that $\psi = (\psi_1, \ldots, \psi_n)$ is the weight vector of the individual users and $\sum \psi_i = 1$. Comparative fuzzy judgments $A = (a_{ij})_{k \times k}$ would be coded for $r$ criteria using Table 1.

A triangular FST function has been used for coding the judgments. The simple pairwise comparison approach (Buckley, 1985) for FST operations has been used for the fuzzy sets $\tilde{a}_i = (\tilde{a}_{i1}, \tilde{a}_{i2}, \tilde{a}_{i3})$ and $\tilde{a}_j = (\tilde{a}_{j1}, \tilde{a}_{j2}, \tilde{a}_{j3})$ as illustrated:

$$
\tilde{a}_i \oplus \tilde{a}_j = ((\tilde{a}_{i1} \oplus \tilde{a}_{j1}), (\tilde{a}_{i2} \oplus \tilde{a}_{j2}), (\tilde{a}_{i3} \oplus \tilde{a}_{j3})) \tag{Equation 1}
$$

The individual priorities are obtained by solving the following system:

$$
\min \sum_{k=1}^{n} \sum_{j=1}^{k} (\ln \tilde{a}_{ij} - (\ln \tilde{w}_i - \ln \tilde{w}_j)^2) \text{s.t. } \tilde{a}_{ij} \geq 0; \tilde{a}_{ii} = 1; \tilde{w}_i \geq 0, \sum \tilde{w}_i = 1
$$

(Equation 2)

The individual priority vector is obtained by $\hat{p}_i = \frac{1}{k} \sqrt{\prod_{j=1}^{k} \tilde{a}_{ij}} / \sum_{i=1}^{n} \frac{1}{k} \sqrt{\prod_{j=1}^{k} \tilde{a}_{ij}}$ (Equation 3)

where $\hat{p}_i$ is the priority of the decision criteria $i$ such that $\hat{P}_i = \{\hat{p}_1, \hat{p}_2, \ldots, \hat{p}_r\}$ for user $i$. In the subsequent step, before the crisp aggregation rules are computed, the consistency of these priorities needs to be evaluated. The geometric consistency index (GCI) is used to estimate consistency of the individual priorities.

$$
GCI(A^h) = \frac{2}{(k-1)(k-2)} \times \sum_{j>i}^r (\log|\tilde{a}_{ij}| - (\log|\tilde{p}_i| - \log|\tilde{p}_j|)^2) \tag{Equation 4}
$$

$GCI(A^h) \leq GCI$ is the criterion for consistency. The collective preferences of the group for deriving the decision vector can be estimated subsequently by the aggregation of individual priorities such that the aggregate collective priority is defined as illustrated:

$$
\tilde{P}^{(c)} = (\tilde{p}_1^{(c)}, \tilde{p}_2^{(c)}, \ldots, \tilde{p}_r^{(c)}) \text{ where } \tilde{p}_i^{(c)} = \frac{\prod_{k=1}^{r} (\tilde{p}_i^{(k)})^{\psi_i}}{\sum_{i=1}^{r} \prod_{k=1}^{r} (\tilde{p}_i^{(k)})^{\psi_i}} \tag{Equation 5}
$$

For crisp conversion of priority $|\tilde{p}_i| = p_{i2} \cdot 0.25 + p_{i2} \cdot 0.5 + p_{i3} \cdot 0.25$ (Equation 6)

Subsequently, after the individual consistent preferences are identified, the consensus index is estimated using the geometric cardinal consensus index (GCCI) used for testing consistency after aggregation of preferences (Escobar et al., 2004).
If $GCCI(M^{d(o)}) \leq GCCI$ for all the $n$ decision makers, consensus is achieved. If consensus is not achieved among the group, the consensus can be further established using the cardinal consensus improvement approach (Dong et al., 2010).

If $GCCI(P^{d(o)}) > GCCI$ then iteratively the subsequently described three-step computations need to be completed, such that group consensus, i.e. $GCCI(M^{d(o)}) \leq GCCI$, is achieved.

Step 1. Assume $GCCI(P^{d(o)}) = \max_i \{GCCi(P^{d(o)})\}$ and $z = \max_n z + 1$ (Equation 8)

Step 2. Let $P^{(k)}_{z+1} = (a^{(k)}_{ij}) n \times n$ (Equation 9)

Step 3. Where $p^{k}_{ij,z+1} = \begin{cases} (a^{(k)}_{ij}) & \text{if } k = \tau \\ (a^{(k)}_{ij}/a^{(k)}_{ij}) & \text{if } k \neq \tau \end{cases}$ (Equation 10)

Step 4. If $GCCI(P^{d(c)}_{z}) \leq GCCI, X = P^{d(c)}_{z}$ else return to Step 1. (Equation 11)

The aggregated priority vector obtained after the achievement of consensus will be denoted as $P^{(c)}_{consensus}$. This consensus vector will be mapped to criteria-specific performances in the sum–product approach. If we go by the two-by-two comparison approach, which is typically used in AHP-based estimation, this would create a very large questionnaire (with a minimum of $\binom{n-1}{2} \times r$ questions, if the $n$ alternatives are higher in number, for each of the $r$ evaluation criteria, where $n$ is the number. Hence, the sum–product approach based on an absolute measurement Likert scale (Kar & Pani, 2014a) has been adopted in this study, since the number of alternative tools which will be evaluated is large.

Let tool $i$ have a performance vector of $T_{i}$, a set of performance scores against the $r$ evaluation criteria $S_{i} = (s_{i1},...,s_{ir})$. Here, $s_{ij}$ is the standardised score of tool $i$ within a predetermined range for criteria $j$. Standardisation ensures the comparability of different criteria, with different measures. The score against a particular criterion offering the highest utility would be coded as 1, and the score offering the lowest utility would be coded as 0. The intermediate scores can be computed from a linear transformation function as demonstrated:

$$S_{ij} = \frac{x - x_{j(min)}}{x_{j(max)} - x_{j(min)}}$$ (Equation 12)

(For positive coded criteria where greater utility is derived from a higher score, e.g. Page rank).

$$S_{ij} = \frac{x_{j(max)} - x_{ij}}{x_{j(max)} - x_{j(min)}}$$ (Equation 13)

(For negative coded criteria where greater utility is derived from a lower score, e.g. Price).
Here, $x_{ij}$ is the absolute score of tool $i$ for criteria $j$, while $x_{j_{\text{max}}}$ and $x_{j_{\text{min}}}$ are the maximum and minimum absolute score on criteria $j$ for all the compared tools. The final performance score for tool $i$ will be computed by the sum–product approach.

$$S_i \cdot P_{\text{consensus}}^c = (s_{i1}, \ldots, s_{ir}) \cdot (p_{1}^{(c)}, \ldots, p_{r}^{(c)}) = |s_{i1} \times p_{1}^{(c)} + \ldots + s_{ir} \times p_{r}^{(c)}| \tag{Equation 14}$$

Based on this sum–product score, the tools may be ranked such that a higher score would indicate a more suitable tool and a lower score would indicate a less suitable tool, in the context of the specific requirement.

5. The case analysis and results

The case study was conducted on a knowledge and news publishing portal, namely Business Fundas (http://business-fundas.com). Business Fundas is a knowledge and news publishing portal, which was initiated in 2008. As of 2014, it had over 55,000 subscribers across different subscription channels. It was developed on an open-source content management platform, namely, Wordpress. It uses many tools and analytics for optimising its presence on the Internet. Seventy percent to 80% of its traffic (a part of which gets converted into subscriptions) comes from the organic search, and specifically from Google. However, very little targeted traffic is derived from social media sites and, hence, the portal needed to explore mechanisms to enhance its presence and visibility in social media platforms. Hence, there was a need to identify a suitable tool to enable such integration and facilitate interaction among the readers.

It was understood that this problem of integration with a social media platform needed to be addressed through a step-wise approach. The first stage in addressing this problem is: which are the social media sites that content-publishing websites like Business Fundas need to focus on? There are many different categories of social media sites, and not all are relevant for content-publishing websites. This question was addressed by the Delphi study. Then, the next stage in addressing this problem is: given the categories of social media sites which are identified as being relevant for content-publishing websites, how do we choose a suitable tool which addresses this requirement for integration with these websites? This was addressed in this study by highlighting an integrated application of FST and AHP for group decision-making under consensus.

Therefore, first, through a Delphi study consisting of five senior decision-makers, the important social media channels which should play a role for the website were identified. These five senior decision-makers comprised two C-level executives, two senior managers (sales and marketing) and a senior business analyst who worked in digital marketing. This expert panel was chosen since they comprised the highest executive-level decision-makers of the organisation as well as the highest decision-makers on the functional level. The average domain experience of the participants of the Delphi study was around 8.2 years, while the minimum experience was 5 years. The sample size was sufficient since most Delphi studies have a sample size of five to 20 domain experts as respondents, and two iterations are often sufficient to achieve consensus in group decision-making (Hsu & Sandford, 2007). The participants were first exposed to all 14 possible channels for social media integration. The participants of the Delphi study was asked to evaluate the importance of the specific channel category on a 4-point Likert-like scale, where a score exceeding 3.25 is considered to be acceptable under consensus. The results of the Delphi study are illustrated subsequently.
The Delphi study highlighted that six channels – i.e., social networking sites, user-sponsored blogs, business networking sites, collaborative websites, podcasts and social bookmarking – would be relevant for this evaluation. The consensus was achieved after two iterations, with a minimum of 80% of the participants voting for the selected channels and 100% of the participants voting against the rejected channels. The results of the Delphi study are illustrated in the subsequent table.

The Delphi study highlighted that six channel categories – namely, social networking sites (C1), user-sponsored websites (C2), business networking sites (C3), collaborative websites (C4), podcasts (C5) and social bookmarking (C6) – were relevant for this evaluation.

In the next stage of analysis, the relative priorities for each of these six channels were evaluated by the four key domain experts for the web-based venture. These members were the most senior in the functions and also in the organisation (i.e. two C-level executives and two senior managers). The individual and aggregated priorities, before the achievement of consensus, are illustrated subsequently in Table 3.

After the priorities were aggregated, consensus was evaluated between the individual priorities and the collective priority. Since consensus had not been reached, consensus was developed using the cardinal consensus improvement approach. The corrected crisp priorities after the achievement of consensus (GOCI = 0.108 < 0.37) are illustrated subsequently in Table 4.

Subsequently, multiple tools for social media integration were evaluated for preliminary shortlisting. There were over 750 open-source plugins listed in Wordpress

<table>
<thead>
<tr>
<th>Relative priority / channel</th>
<th>Uncorrected Crisp Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual priorities</td>
<td>C1</td>
</tr>
<tr>
<td>Expert 1 Priority</td>
<td>0.300</td>
</tr>
<tr>
<td>Expert 2 Priority</td>
<td>0.450</td>
</tr>
<tr>
<td>Expert 3 Priority</td>
<td>0.155</td>
</tr>
<tr>
<td>Expert 4 Priority</td>
<td>0.299</td>
</tr>
<tr>
<td>Aggregate Priority</td>
<td>0.303</td>
</tr>
</tbody>
</table>

Table 3. Individual and aggregate priorities before achievement of consensus.
which provided diverse functionalities for open-source integration of websites and their content with the different channels. Wordpress lists these tools and highlights the number of times these tools have been downloaded, the average user rating for these tools, how many websites are currently using them, and the latest version of Wordpress that these tools are compatible with during the last date of release.

Four criteria were finalised by the group of four key decision-makers, iteratively in three rounds for the initial shortlisting of tools from this list. These criteria were decided by the decision-makers through consensual discussions. These criteria are as follows:

1. The tool must have been downloaded more than 100,000 times;
2. The average user rating for these tools should exceed 4 stars out of 5;
3. At least 50 users should have rated these tools;
4. The version of the open-source tool should have its compatibility tested and recorded with Wordpress release version 3.7 (and preferably with 3.7.1).

Sixteen tools were available which complied with all of the above technical requirements for the shortlisting of the tools. These tools were subsequently also evaluated based on the specific criteria on a 5-point Likert scale, and the subsequent performance scores were normalised, as discussed earlier. Then, the sum of product of

<table>
<thead>
<tr>
<th>S.N</th>
<th>Channels for Social Integration</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digg</td>
<td>0.276</td>
<td>0.338</td>
<td>0.113</td>
<td>0.089</td>
<td>0.085</td>
<td>0.099</td>
<td>SoP Score 4.041 Rank 1</td>
</tr>
<tr>
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<td>Shareaholic</td>
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<td>0.333</td>
<td>0.097</td>
<td>0.079</td>
<td>0.081</td>
<td>0.078</td>
<td>SoP Score 3.248 Rank 3</td>
</tr>
<tr>
<td>3</td>
<td>WP Socializer</td>
<td>0.237</td>
<td>0.377</td>
<td>0.128</td>
<td>0.128</td>
<td>0.081</td>
<td>0.078</td>
<td>SoP Score 2.790 Rank 9</td>
</tr>
<tr>
<td>4</td>
<td>NexiGEN Social Share</td>
<td>0.249</td>
<td>0.328</td>
<td>0.121</td>
<td>0.101</td>
<td>0.095</td>
<td>0.106</td>
<td>SoP Score 3.034 Rank 6</td>
</tr>
<tr>
<td>5</td>
<td>Calicotek Social Slider</td>
<td>0.327</td>
<td>0.333</td>
<td>0.097</td>
<td>0.079</td>
<td>0.081</td>
<td>0.078</td>
<td>SoP Score 2.412 Rank 14</td>
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<tr>
<td>6</td>
<td>Simple Social Icons</td>
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<td>0.377</td>
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these capabilities against these dimensions was evaluated for each tool. This brought out the overall performance score for each of these tools, based on the prioritised performances against each evaluation criterion. The computation of this process is illustrated in Table 5.

As is evident in Table 5, from among the 16 tools or plugins which were compared, based on the integration capabilities within the six social media channels, Digg Digg plugin performed the best, followed closely by the Wordpress Social Share Buttons.

6. Validation of approach

The outcome of the computational approach was compared with Kar (2014b), wherein a similar method was used, albeit without the achievement of consensus. While the objective of Kar (2014b) was similar, consensus achievement using suitable theories was not the focus of that study, although achievement of consensus is an important dimension in the enhanced effectiveness of group decision-making (Kerr & Tindale, 2004). Also, the consensual ranking of the set of 16 solutions by the group was done to establish adherence of the outcome to group prioritisation under consensus. To compare the outcome of this evaluation process, the outcome was again computed using the simple aggregation approach using AHP (Kar, 2014b). Subsequently the Spearman’s rank correlation coefficient was estimated as a measure for validation and control against the consensual ranking among the group of decision-makers, through discussions. To avoid bias among the decision-makers due to influencing factors (Gray & El Sawy, 2010), all the decision-makers were awarded equal weight while estimating priorities, as indicated in the subsequent table.

Since group decision-making under consensus is considered more effective than decision-making by individuals (Kerr & Tindale, 2004) – due to dimensions such as the assembly bonus effect, recognition of member expertise, collectivism in working together and group identification – the ranking via consensual discussions was taken as the basis for further evaluation of approaches (in line with Kar & Pani, 2014a).

Table 6. Overall performance of the tools for social integration.

<table>
<thead>
<tr>
<th>Comparison of approaches</th>
<th>Group Decision Making</th>
<th>Individual Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Digg Digg</td>
<td>1</td>
<td>1</td>
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<td>2 Shareaholic</td>
<td>4 3</td>
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Stats: Correlation coefficient N/A 99.41% 97.65% 98.53% 90.29% 98.18% 98.82%
From the results, it was evident that the precision of the current approach using theories of consensus achievement was higher than the approach using a simple aggregation of priorities, as done in Kar (2014a). Further, it is interesting to note that Levene’s statistic for the solutions from the total sum product score obtained from individual prioritisation was calculated to be $1.482 (< F_{3,60}^2 = 4.1259)$, which indicates that there is significant difference in the individual prioritisation, and, thus, the reliability of group prioritisation is higher.

7. Conclusion and recommendations for practice

The study highlights an approach for group decision-making under consensus with which the collective expertise of a group of decision-makers can be jointly leveraged to select a suitable tool for social media integration based on a context-specific requirement. The use of the integrated approach of three methodologies – namely the Delphi method, FST and AHP – on group decision-making has been highlighted in this study. The approach highlights how the selection of an appropriate tool is enriched by the collective decision-making of a group of experts. The achievement of consensus while using these theories is an important dimension in the analysis. The approach presented extends the work of Kar (2014b) by highlighting the use of theories for group decision-making under consensus, and establishes the higher precision of the current approach in comparison to individual prioritisation as well as to simple aggregation of the priorities in a group.

The insights provided by this study should be extremely valuable, in specific ways, to firms looking to develop a social media strategy. First, the Delphi methodology may be adopted to select which specific channels among all the social media channels would be relevant for the firm, based on their specific business need. For example, a company which specialises in talent recruitment may want to develop a social media strategy that is closely connected to a website like Linked-In. Similarly, another firm which may be a content-publishing business in the domain of entertainment may have a need to be present on sites like Digg and Facebook. After selecting these channels, as elaborated in the study, the next stage would be to prioritise these channels using the AHP method. Firms could leverage their in-house domain knowledge while prioritising these social media channels based on their specific needs. Then, finally, they could evaluate the alternative tools, based on their specific needs, while finally selecting the most suitable tool for enabling social media integration for their websites. Further, the study highlights the already available tools and their competencies. This would be a good starting point for practitioners to begin their evaluation, and select a tool for social media integration, if in-house expertise for evaluation is not available.

8. Future research directions

The current study can be extended by integrating other decision support theories with AHP and its associated theories for group decision-making, which has already been used in the existing literature, such as fuzzy goal programming (Kar, 2014a; Yu, 2002), TOPSIS (Shih, Shyur, & Lee, 2007) and other multi-valued logic-based approaches. Since the problem domain is of significant importance, in the current context, such exploration would provide better approaches for strategizing and operationalizing the integration of websites of businesses with social media. Further, an approach may also be taken in which a larger sample is used for the overall performance ranking of the
available tools for social media integration, based on platform dependency with open-source content management systems like Wordpress, Joomla or Blogger. The focus could be an overall competency mapping of the tools available for social media integration. This would be of significant interest to practitioners and analysts. However, in such a case, a different method would be needed for addressing the selection problem, which can evaluate a significantly larger alternative.

References


