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A web-based hybrid system for blended electronic, mobile and social media marketing planning

Shuliang Li
Jim Zheng Li

School of Electronics and Computer Science, University of Westminster

This is a copy of the author's accepted version of a paper subsequently published in the proceedings of the International Conference on Computer Science and Service System (CSSS 2012). IEEE, pp. 3549-3552. ISBN 9781467307192. It is available online at:

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This paper was first published on the International Conference on Computer Science and Service System (CSSS 2012), 2012, Nanjing, China. The citation details: Li, Shuliang & Li, Jim Zheng (2012), "A Web-based hybrid system for blended electronic, mobile and social media marketing planning". In: IEEE Proceedings of the International Conference on Computer Science and Service System (CSSS 2012). IEEE, pp. 3549-3552. ISBN 9781467307192.

A Web-based hybrid system for blended electronic, mobile and social media marketing planning

Shuliang Li
Westminster Business School
University of Westminster
35 Marylebone Road, London NW1 5LS
UNITED KINGDOM
E-mail: lish@wmin.ac.uk

Jim Zheng Li
Deutsche Bank Group Services (UK) Limited
1 Appold Street
London EC2A 2HE
UNITED KINGDOM
Email: jimzhengli@gmail.com

***Abstract* — A Web-based hybrid intelligent system, WebIntegrated (developed by the authors), for developing blended e-marketing, mobile marketing and social media marketing strategies is reported in this paper. The concepts, software system and associated elements or components are presented. A brief demonstration of the data entries and outputs are also provided.**

Keywords - decision support system; fuzzy logic; knowledge automation expert system; marketing; e-marketing; mobile marketing; social media marketing

I. INTRODUCTION

The emergence and development of electronic, mobile and social media marketing are creating new opportunities and raising the issue of integration of marketing mix and strategies. The advance of ICT would make the combination and coordination of conventional, digital, mobile and social media marketing strategies and associated marketing mix into one holistic framework feasible. The powers of Web technologies, artificial intelligence, and decision support would enable decision-makers to fully exploit their potentials, make the right decisions and survive in the dynamic and uncertain market contexts. This paper reports a Web-based hybrid system in support of integrated marketing strategy formulation.

II. THE WEBINTEGRATED SYSTEM

On the basis of the concepts of systems and hybrid systems discussed by von Bertalanffy [15], Goonatilake and Khebbal [2], Hopgood [3], Li [6], Li & Li [7, 8, 9], we give the following definition for hybrid intelligent decision support systems on the Web or over the Internet:

"A Web-based or Internet-enabled system that is comprised of various interacting and interrelated functional elements and integrates the advantages or strengths of diverse techniques or technologies including one or more artificial intelligence techniques or technologies for the following purposes: serving for specified objectives or functions; dealing with the different facets of a given problem; delivering analytical models; providing useful information; automating domain expertise; generating intelligent recommendations; and supporting human decision-making or problem-solving via the Internet, extranets or intranets."

WebIntegrated is a hybrid intelligent system that was designed by the authors to focus on and specifically support the conventional, digital, mobile and social media marketing aspects and dimensions of strategy formulation. In particular, the system aims to support: 1) simulating and assessing variables influencing and determining integrated marketing strategies, and 2) performing approximate reasoning under uncertainty and advising blended conventional, electronic, mobile and social media marketing strategy alternatives or options.

WebIntegrated was constructed on the basis of the client-server structure, with server-side coding, scripting, programming and software creation. The following open-source tools were employed in this project: MySQL (a Web-based relational database management system), PHP (Hypertext Preprocessor), JSON (JavaScript Object Notation), and HTML (HyperText Markup Language).

Following the mathematical, computational and knowledge automation framework proposed by S. Li and J.Z. Li [10, 11], the WebIntegrated system hybridises the powers and benefits of Web technology, online computer simulation, fuzzy logic, Web-based expert system knowledge automation and Web databases to assist managers in the process of mixed marketing strategy formulation. It has been designed to deliver enhanced support by incorporating the state-of-the art decision support and artificial intelligence techniques and utilising various marketing models.

A Web-enabled *Monte Carlo simulation module* is developed to represent and simulate the uncertainties and

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variations in relation to the marketing variables or factors. This utilizes triangular probability distributions and the inverse function of a cumulative distribution of the triangular probability distribution. *Fuzzy logic* is programmed to symbolise and implement pertinent variables, and compute the grades of certainty for digital marketing factors using trapezoidal membership/compatibility functions for the variables considered. *A knowledge base* is constructed to apply "if … then …" rules and fuzzy rules for representing relevant conventional, electronic, mobile and social media marketing models, and relevant domain knowledge obtained from the literature. An *inference element* is designed to carry out forward chaining under uncertainty to generate digital marketing strategy alternatives with various levels of confidence. A *Web-server database component* is developed to store simulation results, and saves and retrieves the user's judgemental inputs and data entries. The *Web-based user interface* is coded to aid the dialogue between the user and the WebIntegrated system.

The electronic/digital marketing strategy knowledge was collected and synthesized on the basis of the literature. McDonald [18]'s four-box marketing strategy development matrix and Watson and Zinkhan [17]'s Internet strategy grid were adapted and extended by the authors to cover electronic marketing dimensions including expertise and guidelines from Varadarajan and Yadav [16], Sultan and Rohm [14], and Gay, harlesworth and Esen [1]. Expertise on e-marketing strategies for international markets was acquired from Sheth and Sharma [13]. Domain knowledge on mobile marketing strategies and mobile marketing mix was obtained from Leppaniemi and Karjaluoto [5]. The social media marketing knowledge were acquired from Kaplan and Haenlein [4] and Mangold and Faulds [12]. The authors have also created and developed a four-cell strategic grid/matrix for mobile marketing strategies with a logical linkage to Leppaniemi and Karjaluoto [5]'s guidelines.

III. A Demonstraion of Data Entries and System Outputs

In this section, we demonstrate the data entries and WebIntegrated outputs using screen copies for the software execution.

Figures 1-5 illustrate data entry screens for the variables affecting market attractiveness, competitive strengths, the needs for mobile marketing, available level of budget, social media marketing factors.

An external analytic hierarchy process (AHP) tool [7] can be employed to perform pair-wise comparisons and help judge which factors or variable are less or more important to decisions than others, and help determine the weights of relevant factors or variables.

Figure 6 displays part of the blended conventional, digital, mobile and social media marketing strategies with fuzzy logic-based certainty level. Figure 7 shows part of the mobile marketing strategies with a fuzzy logic-based level of confidence. Figure 8 demonstrates partial output from the social media model.

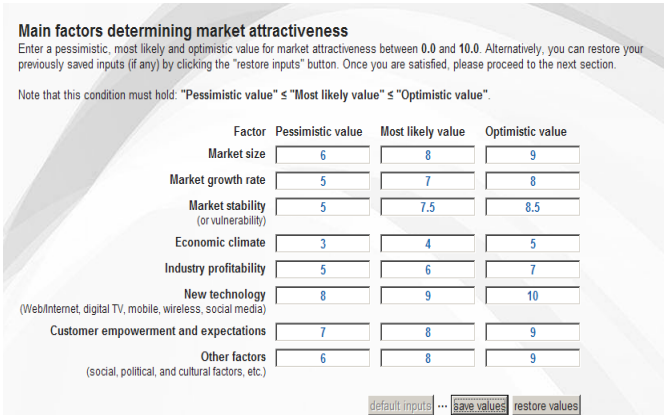

Figure 1. A screen copy of data entries for marketing attractiveness

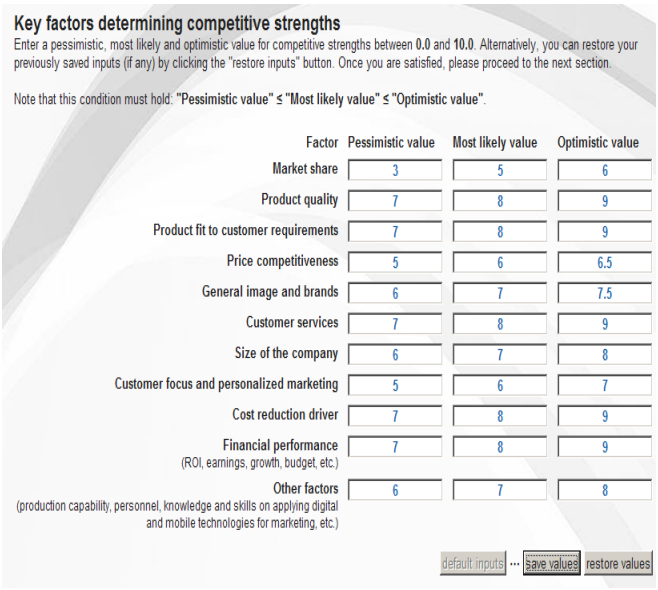

Figure 2. A screen snapshot for data inputs for competitive strengths

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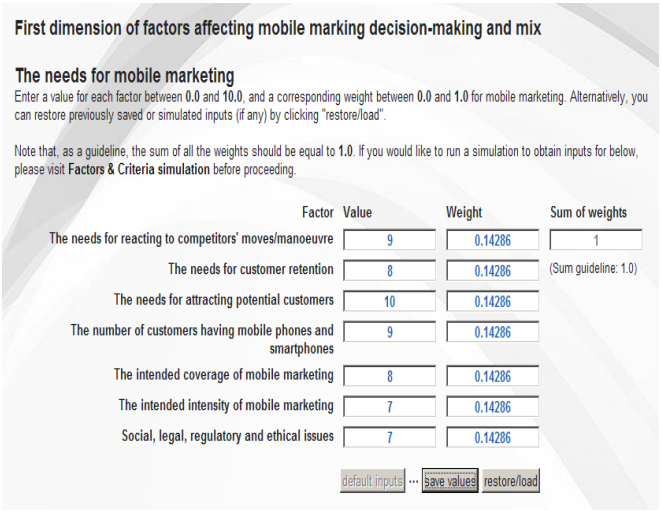

Figure 3. A screen example for data entries for mobile marketing variables

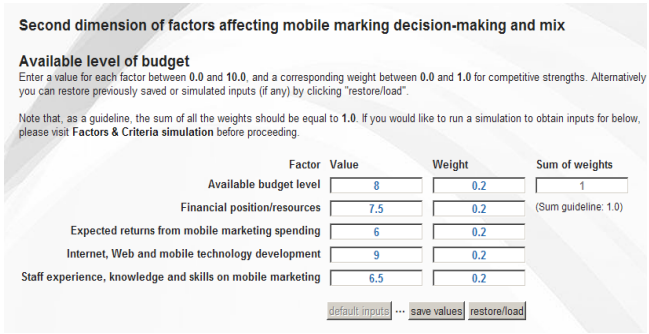

Figure 4. A screen shot for available level of budget

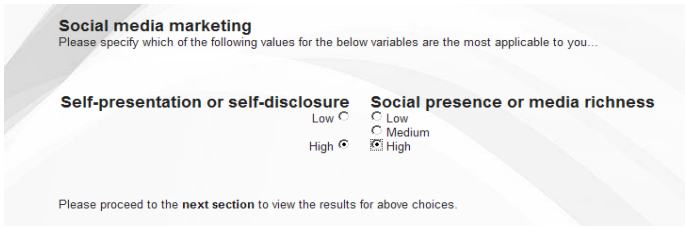

Figure 5. A screen copy for making choice for the social media marketing

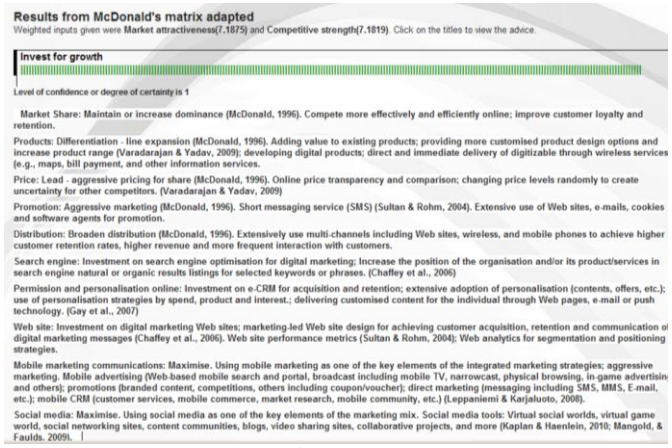

Figure 6. An output screen shot for the extended McDonald strategy model

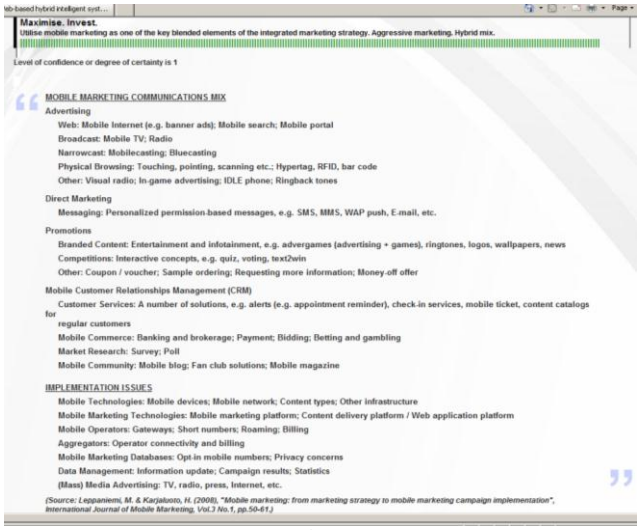

Figure 7. An output screen snapshot for the mobile marketing strategy model

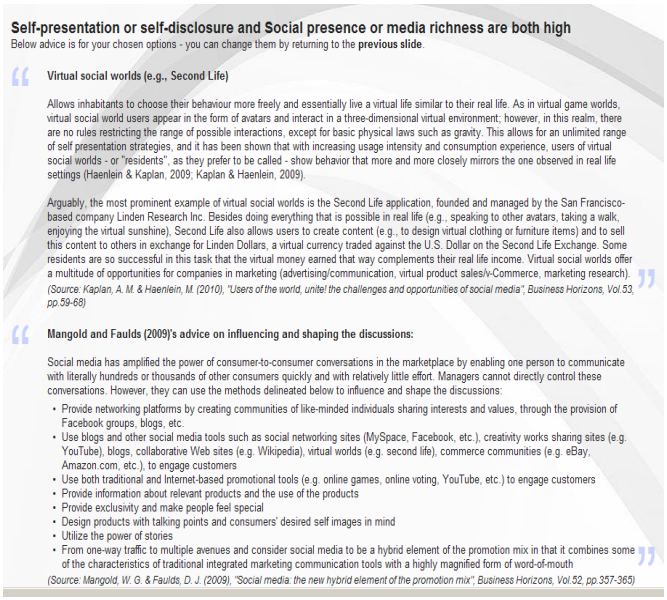

Figure 8. An output screen copy for the social media marketing model

VI. Concluding Remarks

In this paper, we have introduced and described a Web-enabled hybrid intelligent system, called WebIntegrated, for integrated conventional, electronic, mobile and social media marketing strategy formulation. The concepts, system elements and an illustration of system execution have been presented in the paper. WebIntegrated has good potential in enhancing and improving the efficiency and effectiveness of the blended marketing strategy planning process. It can also be used as a smart software tool for training marketing managers and students.

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To make progress on this project, further work is being undertaken to test and evaluate the overall value and impact of the WebIntegrated system with company directors and managers. The WebIntegrated system will also be extended to include more marketing strategy models and domain knowledge.

ACKNOWLEDGMENTS

The WebIntegrated system was created and developed by Jim Zheng Li and Dr Shuliang Li in the summer of 2011. They therefore own the copyright of this software product.

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