Analysis and Design Business Directory for Micro, Small and Medium Enterprises using Google Maps API and Multimedia

Suselo Thomas, Suyoto, Dwiandiyanta B. Yudi

Abstract—This paper explain about analysis and design a business directory for micro-scale businesses, small and medium enterprises (SMEs). Business Directory, if implemented will facilitate and optimize the access of SMEs to ease suppliers access to marketing. Business Directory will be equipped with the power of geocoding, so each location can be easily viewed SMEs on the map. The map will be constructed by using the functionality of a web-based Google Maps API. The information presented in the form of multimedia that can be more interesting and interactive. The method used to achieve the goal are: observation; interviews; modeling and classifying business directory for SMEs.

Keywords—Business directories; SMEs; Google Maps API; Multimedia; Geocoding ommas

I. INTRODUCTION

PRODUCTION of micro-scale businesses, small and medium enterprises (SMEs) are one part of industrial development in Indonesia. SMEs are the perpetrators of the majority of the national economy. Central Statistics Agency (BPS) last mentioned there are 51.3 million units or 99.91 percent of the business in Indonesia. That is, prolapse to SMEs will greatly disrupt the nation's economic pulse. In terms of employment is also the highest, 90.9 million workers or 97.1%.

In Yogyakarta Special Region (DIY), Indonesia, there are many SMEs are mostly engaged in handicraft industry [43]. Judging from the aspect of people's income and employment, SME sector is an excellent economic sectors. Additionally SME sector is the catalyst of local economic growth and community participation to micro or family level, so that SME industry sectors have a strategic role.

During its development, SMEs have constraints such as lack of access to suppliers and markets; limited use of technology; inefficiency; and managerial weakness also resulted in the decline of industrial SMEs. Need the support and participation of all parties in finding a solution of the constraint [8]. Problems most often arise in the development of SMEs is related to the characteristics of SMEs that is the lack of innovation and adoption of new technologies, marketing and lack of access to potential markets. Therefore there is need for assistive technologies to help SMEs in the face of shocks and solve problems in technology adoption. One of these technologies is a business directory for SMEs.

Suselo Thomas is with the Informatic Engineering Department, University of Atma Jaya Yogyakarta Indonesia (email : thomas@staff.uajy.ac.id)

Suyoto is with the Informatic Engineering Department, University of Atma Jaya Yogyakarta Indonesia (email : suyoto@staff.uajy.ac.id)

Dwiandiyanta B. Yudi is with the Informatic Engineering Department, University of Atma Jaya Yogyakarta Indonesia (email : yudi-dwi@staff.uajy.ac.id)

A Business Directory, if implemented will facilitate and optimize the access of SMEs to accelerate suppliers access to marketing, so that SMEs location information can easily be found. Business directories will be presented in the form of a map using Google Maps API technology and multimedia which includes areas of the city of Yogyakarta. The development of this business directory can provide a container for SMEs and to know the location where the business is located.

II. SPECIFIC OBJECTIVES

This research aims to develop a business directory for SMEs using the Google Maps API and multimedia. Development of the directory business is conducted in three stages, namely:

1) Analysis of clustering of SMEs in the business directory, Of the situation and condition of existing SMEs in Yogyakarta, then grouped into a business directory. In the end will get the appropriate business directory.

2) The design prototype of SME business directory using the Google Maps API and multimedia, Of the several models generated business directory, tried to make specifications, descriptions, and the prototype software and / or hardware. The software that generated the form on-line (web based)-based multimedia.

3) Implementation for SMEs. From the resulting prototype, made of the installation and testing of prototypes to accommodate the data and chart in the form of a business directory of SMEs in Yogyakarta; socialization on SMEs (SMEs through workshop forums), as well as the application of a business directory on SMEs in Yogyakarta together.

III. URGENCY OF RESEARCH

Thousands of small and medium enterprises (SMEs) across the DIY threatened bankruptcy. The reason, they are still heavily in debt issues with banks and lenders after the earthquake of 2006. Was coupled with the implementation of the Asean-China free trade.

To save the SMEs in Yogyakarta that this potential requires a comprehensive strategy and serious attention from various parties, particularly the universities and the government. Participation of SMEs are the backbone of local economy, because the perpetrators are almost entirely business is very weak and limited capabilities. At least three issues that urgently need an immediate solution is access: capital, suppliers and marketing [21]. To speed up the recovery of SMEs, it is necessary to bridge between suppliers, SMEs, and consumers. This can be done with the use of technology to map in a web based business directory. Given the complexity of the problems and the diversity of SMEs in DIY, then the research is done in three stages: preparation analysis business

World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
Vol:6, No:6, 2012

directory model, prototype design, and implementation in SMEs. Phase analysis of the preparation of a model made for photographing the profile of SMEs. From the SME profiles, researchers can map the desire and reality (actual content) of SMEs in the interaction with suppliers and consumers. So in the end will come some models a business directory that match the characteristics of SMEs.

From the model business directory for SMEs generated, researchers conducted a prototype design stage business directory for SMEs. Design process is done by making the specifications, descriptions, and the prototype software and / or hardware. This phase will produce a prototype of SME business directory.

With the realization of a prototype, researchers need to perform installation and testing process, which is part of the implementation phase. From this process, researchers can see the advantages and disadvantages of business directories are generated in the first stage. The prototype of the model business directory can be an alternative choice for SMEs tailored to the circumstances of SMEs. Through the workshop forum SMEs, the process of socialization and dissemination done for SMEs, especially SMEs in the DIY industry.

In this research the authors intend to make the analysis and design business directory for SMEs using the Google Maps API and multimedia. SMEs location information will be presented in the form of a map using Google Maps API facility that includes the city of Yogyakarta. Development List Business Directory is hoping to provide a container in the form of a web of different types of business and know the location where the business is located. This application is intended for immigrants in general, prospective investors and investors and citizens of Yogyakarta, in particular, hoping to save time to get the information you are looking for SMEs. In the system developed there are also facilities for searching the shortest path to the location of SMEs. The information presented in the form of multimedia that can be more interesting and interactive.

IV. LITERATURE REVIEW

A. Google Maps API

Google created the Google Maps API to facilitate the construction and development of a web-based map applications to meet user needs. With use traditional Google Maps API, users can insert the entire facility and existing technology into a website. The main thing needed in the development of applications using this API is the API Key. API Key is the key value or a marker that should be owned website that you want to add Google Maps API facilities. API Key for each site will vary in value.

Map application development that uses Google Map API uses Javascript language. Whether it's the language Javascript Javascript language in general and specially developed by Google called Google Google Maps Javascript for development. To be able to utilize the Google Maps API services. Google Maps API provides classes, types and functions that can be used to build a Google Maps applications.

Google Maps API is used freely in cartography [34] and resolve the issues in the debate that there is no GIS [28]. Google Maps can be run directly on the browser and does not require downloading a plug-in when using the JavaScript API. Google Maps API is easy to display the KML file, a format that is capable of displaying spatial information quickly [17]. There are many resources to learn and use the Google Maps API, the code online documentation and manual techniques [14] [4]. There are online tools that can be used such as GeoCommons Maker which can be used effectively [18]. Application created by using Google Maps allows users to add maps on a web page made [33]. Figure 1 is the result of research Ross et al. [36], using Google Maps to illustrate the magnitude of criminal incidents in the District of Columbia.
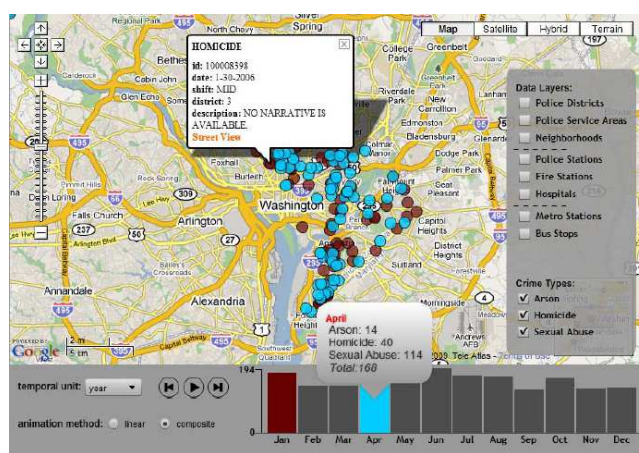

Fig. 1 Google Maps for depiction of Genesis Crime [36]

Studies conducted evoke a variety of maps, and images for the visualization system image on a web-based environment is a big part to develop visualization techniques for the development environment [2]: for ionic city imagery, geodemographics, landscape activity, etc. Hudson-Smith et al. [2] have also developed a web-based service applications that are used for public domain GIS, mapping and imaging. Johnson [19] developed a system of visualization techniques for spatiotemporal information. Johnson et al. [20] also has developed a system that can map and analyze the spread of asthma, as shown in Figure 2.

B. Geocoding Service

One of the fundamental things related to the process of geocoding is the standard used for descriptive mendeksripsikan a location, eg in the form of address. Currently, the addressing scheme used by several different countries, even countries that do not have a mechanism to organize addressing infrastructure. This uncertainty led to a concept and the basic parameters to perform geocoding process with a flexible addressing scheme [7].

World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
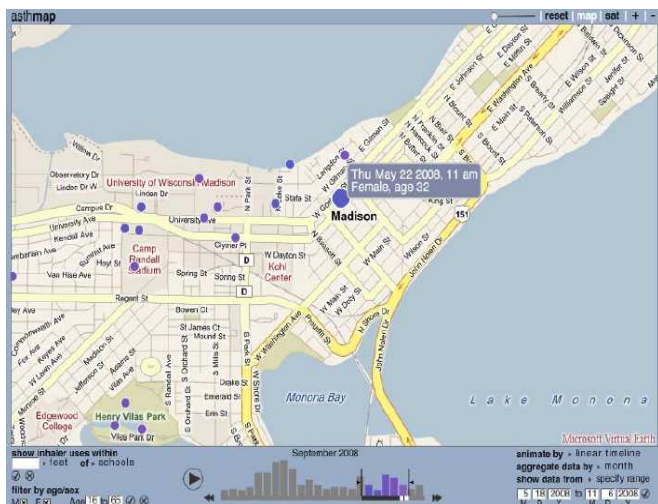Vol:6, No:6, 2012

Fig. 2 Google Maps for Analysis of Asthma Disease [20]

Geocoding involves a clear descriptive location to be mapped into the x and y coordinates (longitude and latitude). Geocoding method consists of three methods, namely geocoding based on street address, zip code based geocoding, and geocoding based on a boundary (boundary). Of the three methods, based on street address geocoding method is the most accurate [10].

Other developments in the geocoding process is the growing quality of the data set descriptive location at street level (street level dataset). This quality improvement include the full geometry datri a road, the location and form certainly, attributes the growing segment of the path is complete and correct, the house numbering range and others. This allows the evolution of the geocoding process is the result of the geocoding process can be the best results (best match) [34].

Research in health-related information about people, places, events, and time, eg epidemic also involves the use of spatial data obtained from the geocoding process to represent the subject of research. The problem faced is how the process of geocoding can be done well in order to generate spatial data descriptive of the location of the research subjects well too. North American Association of Central Cancer Registries (NAACCR) has released a guide that can be used to help standardize the process of geocoding [15].

Geocoding service is currently also available on the Internet, such as the Free Global Geocoder (http://www.backups.nl/geocoding/), Geographic Names Information System (http://geonames.usgs.gov/), Geobase (http://geobase.ca/), geonet Names Server (http://earth-info.nga.mil/gns/html/), and others. These services usually are one-way, or in other words, service providers have provided data that can be accessed by users of the service. This of course resulted in service providers should collect data geocoding results from descriptive locations that typically require more resources both in time and the other side.

C. Multimedia

According to M. Suyanto in his book, Multimedia Tools to Enhance Competitive Advantage explained that there are various definitions of multimedia [42], among others:

1) According to McCormick (1996) "Multimedia is generally a combination of three elements, namely voice, image and text".
2) According to Robin and Linda (2001) "Multimedia is a tool that can create dynamic and interactive presentations that combine text, graphics, animation, audio, and video images".
3) According to Turban et al (2002) "Multimedia is a combination of at least two media input or output of data, this medium can be either audio (voice, music), animations, video, text, graphics, and images".

V. ANALYSIS AND DESIGN

A. Micro, Small and Medium Enterprises (SMEs)

From the initial observations that have been performed on a number of SMEs in the DIY, it turns out there are many parties involved in the networking of SMEs as shown in Figure 3.
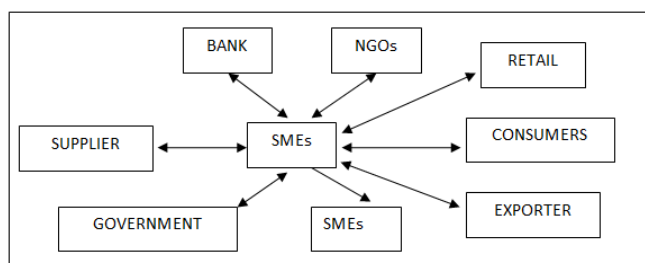

Fig. 3 Network of SMEs with various parties

From the initial observation that has been done, SMEs establish networking with suppliers and customers with a variety of shapes and ways. Consumers SMEs in part a direct consumers who buy in large quantities, most are of the handicrafts retailers, galleries, and some are exporters. SME suppliers are predominantly SMEs as well.

According to Macpherson and Wilson [26], to enhance the capabilities of SMEs as one of the units supporting the new economy, the role of Supply Chain Relationship (SCR) has become one of excellence. With more and more related to the various parties as well as structured management, will increase the competitiveness of SMEs. Macro in the SCR process according to Chopra and Meindl [5] include: SRM, ISCM, and CRM as shown in Figure 4.

SRM	ISCM	CRM
SCR		

Fig. 4 Components of the SCR

Lang et al [23] showed that the activity of SRM and CRM can actually be akin and integrated so as to produce maximum benefit. To integrate the SRM, ISCM, and CRM, it takes the appropriate IS. In principle, Information Systems are the various components that are interconnected and work together in collecting, processing, storing, and mendeseminasikan information to support decision-making, coordination, control, analysis and visualization in an organization [24].

World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
Vol:6, No:6, 2012

The design of the IS for SMEs can be viewed from:

1) SME business strategy that includes three aspects, namely: virtualization, molecularisation, and disintermediation [44].
2) Relationship between the role and relevance of marketing in SMEs that can be classified in four models, namely: dominated, led, independent, and weak [39].
3) Elements of culture and social responsibility, such as organizational culture and entrepreneurship skills [40] [12] [39].

Marketing activities of SMEs has grown into a virtual business [37] [41]. Conceptually, constraints and opportunities in SMEs is the utilization of information technology in gaining information and use it[11].

B. The design prototype of SME business directory

Software design of SME business directory includes five phases, namely analysis, design, development, implementation, and testing. In these phases are considered aspects of the consumer, the environment of SMEs, and the use and improvement of the system.

The first phase is analysis phase. This phase sets the direction of software development with the objective of developing SME business directory, the directory model profiles of SMEs and SMEs. This analysis is carried out through cooperation between SMEs and software developer in researching SMEs business directory based on the objectives to be achieved. This analysis is used to determine the specifications and software requirements.

The second phase is the design of software based on the model of SME business directory. The design of the software include database design and software interface. Software interface created using web technology. Multimedia is used to make the software more attractive.

The third phase is the phase of software development based on the model of SME business directory that had been developed, to create a prototype software SME business directory.

In the fourth phase, namely the implementation, these units have been developed are tested to obtain input from potential users.

The fifth phase is the testing phase to determine the strengths and weaknesses of software has been developed. This evaluation needs to be done to improve the software. The evaluation was conducted in UAJY environment. These five phases can be repeated as necessary cyclical. The results of this phase is the software in the form of on-line (web based) and multimedia-based.

When designing the hardware business directory SMEs are the steps to produce a business directory of SMEs in the form of paper based (such as product catalogs, brochures, etc.). Steps taken almost the same with software development on top of the fifth phase also perform a cyclical repeated as necessary.

C. Implementation of prototype directory of SME on SMEs

From the resulting prototype, made of the installation and testing of prototypes in a few samples of SMEs; socialization on SMEs (SMEs through workshop forums), as well as the application directory on SME businesses independently or together. The third details the research activities is presented in Table I. When the flow chart of research methodology as presented in Figure 5.

TABLE I
DETAILS OF THE RESEARCH ACTIVITIES

Year	Activity
1	Analysis of the preparation of model SME ○ Identify the profile of SMEs in DIY ○ Mapping desire and reality (actual content) management of SMEs in DIY ○ Development of several models as a basis for designing SME business directory
	The design prototype of SME business directory ○ manufacture of software specifications and / or hardware ○ description of the manufacture of software and / or hardware
2	○ manufacture of prototype software and / or hardware ○ testing and evaluation of software and / or hardware at the University of Atma Jaya Yogyakarta
	Implementation in SMEs ○ installation and testing of prototype software and / or hardware on multiple samples of SMEs ○ socialization on SMEs (SMEs through workshop forums); ○ application of the SME business directory independently or together

TABLE II
INDICATORS OF ACHIEVEMENT

| Year	Achievement Indicators
1	The formation of the most appropriate model for SME business directory • Completion of the document and the Software Requirements Specification • Document the completion of the Software Design Description
2	The product prototype is ready • Completion of design documents, and Results Description of Software Testing • Have been conducted finished product testing and revision courses • The product has been installed and deployed and can be used by all users • Socialization has been carried out through forums and workshops SMEs
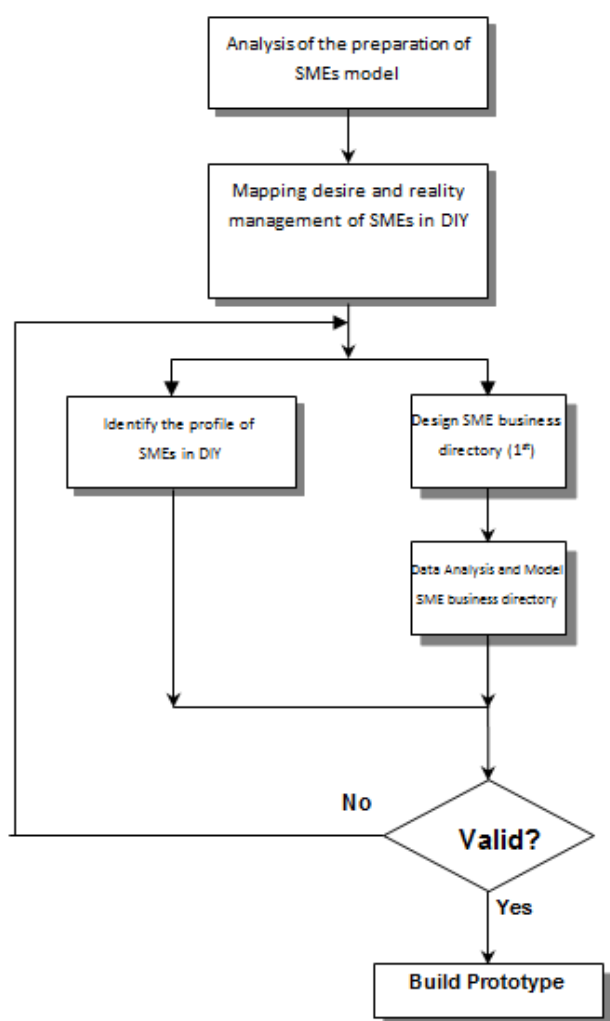
Fig. 5 Flow chart of research methodology

VI. CONCLUSION

Preparation of a prototype methodology for SME business directory assist in conducting the research process step by step. Business directory is an valuable tool for SMEs to introduce, market and expand the market. Relationships in the SME network tobe good because of all activities can be conducted directly and transparently. This prototype can be developed further to do in the real implementation in the SMEs so that immediate benefits for SMEs.

REFERENCES

[1] Agastiya, Bayu, 2010, Development of Geographic Information System Web-based Sugar Land Mapping using GPS and Google Maps API, Informatics Engineering Program Thesis (Unpublished), University of Atma Jaya Yogyakarta, Yogyakarta.
[2] Batty, M., and Hudson-Smith, A., 2007, imagining the Recursive City: Explorations in Urban Simulactra, in HJ Miller Societies and cities in the Age of Instant Access, Springer, Dordrecht, Neherlands, pp. 39-55
[3] Boulos, MNK, 2005, Web GIS in practice III: Creating a simple interactive map of England's Strategic Health Authorities using Google Maps API, Google Earth KML, and MSN Virtual Earth Map Control, International Journal of Health Geographics, 4, 22.
[4] Brown, MC, 2006, Hacking Google Maps and Google Earth, Indianapolis, IN, Wiley.
[5] Chopra, S. and Meindl, P., 2004, Supply Chain Management: Strategy, Planning, and Operations, 2 nd ed., Pearson Education International, New Jersey.
[6] Danusastro, L., 2006, Market Performance and Export Performance Crafts World Crafts, DIY Dekranasda.
[7] Davis, Augusto Jr.., Clodoveu; Torres Fonseca, Frederico; De Vasconcelos Borges, Karla Albuquerque, 2003, A Flexible Addressing System for Approximate Geocoding, Geoinfo 2003.
[8] DIY Dekranasda, 2005, Strategic Business Management Craft Efficient.
[9] Ministry of Industry and Trade of Indonesia, 2002, RIP SMEs from 2002 to 2004, Book I: Policy and General Strategy Small and Medium Industry Development, http://www.dprin.go.id/Content7.asp?kd6dg=070105 # 070 105.
[10] Dramowicz, Ela, 2004, Three Standard Geocoding Methods, from the site http://www.directionsmag.com/article.php?article_id=670&trv=1 , accessed March 12, 2009.
[11] Fillis, I., Johansson, Ulf, and Wagner, B., 2003, A conceptualization of the Opportunities and Barriers to Business Development in Small Firm, Journal of Small Business and Enterprise Development, 10 (3), 336-344.
[12] Fletcher, D., 2002, A Network Perspective of Cultural Organising and "Professional Management" in the Small, Family Business, Journal of Small Business and Enterprise Development, 9 (4), 400-415.
[13] Gibin, Maurizio , Alex Singleton , Richard Milton , Pablo Mateos and Paul Longley , 2008, An Exploratory cartographic visualization of London through the Google Maps API , Applied Spatial Analysis and Policy , Volume 1, Number 2
[14] Gibson, R. & Erie, S., 2006, Google Maps Hacks, Sebastopol, CA, O'Reilly.
[15] Goldberg, DW, 2008, A Geocoding Best Practices Guide, The North American Association of Central Cancer Registries Of, from the site http://www.naaccr.org/filesystem/pdf/Geocoding_Best_Practices.pdf , accessed March 10, 2009.
[16] Hadi, 2009, Property Advertising System Development Using J2ME and Maps Online, Informatics Engineering Program Thesis (Unpublished), University of Atma Jaya Yogyakarta, Yogyakarta.
[17] Harrower, M., 2009, Cartography 2.0 .
[18] Harrower, M., Heyman, D., Sheesley, B. & Woodruff, A., 2008, Maker! Mapping the world's data , NACIS 2008. Missoula, MT.
[19] Johnson, ZF, 2008, SpatialKey: Insanely good geovisualization .
[20] Johnson, Z., Harrower, M., Mcglynn, E., Roth, R., Sickle, DV & Woodruff, A., 2007, Development of an online visualization tool for the mapping and analysis of asthma exacerbations in space and time , NACIS 2007. St. Louis, MO.
[21] Kusumaharta, 2005, Pemasaran Kerajinan DIY Pasca Bencana: Peluang dan Tantangan , Dekranasda DIY.
[22] Küpper, Axel, 2005, Location-Based Services: Fundamentals and Operation , John Wiley & Sons.
[23] Lang, A., Paravicini, D., Pigneur, Y., dan Revaz, E., 2002, From Customer Relationship Management (CRM) to Supplier Relationship Management (SRM) , HEC Lausanne 2002, http://inforge.unil.ch/yp/Pub/02-SRM.pdf.
[24] Loudon, KC, Loudon, JP, 2006, Management Information System: Managing the Digital Firm , Pearson Education.
[25] Maceachren, AM & Dibiase, D., 1991, Animated maps of aggregate data: Conceptual and practical problems , Cartographic and Geographic Information Science , 18 , 221-229.
[26] Macpherson, A. dan Wilson, A., 2003, Enhancing SME's Capability: Opportunities in Supply Chain Relationship , Journal of Small Business and Enterprise Development, 10(2), 167 – 179.
[27] McConchie, AL, 2008, Mapping Mashups: Participation, collaboration, and critique on the World Wide Web , Geography. Vancouver, Canada, The University of British Columbia.
[28] Miller, CC, 2006, A beast in the field: The Google Maps mashup as GIS/2 , Cartographica , 41 , 187-199.
[29] O'Reilly, T., 2007, What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software , Communications & Strategies .
[30] Pan Bing , John C. Crotts and Brian Muller , 2007, Developing Web-Based Tourist Information Tools Using Google Map , Information and Communication Technologies in Tourism 2007

World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
Vol:6, No:6, 2012

[31] Peterson, M., 2008, Choropleth Google Maps . Cartographic Perspectives , 60 , 80-83.

[32] Purnama, LIP, Suharyanti, Y., Bawono, B., 2007, Pemetaan Model Jejaring Usaha Mikro Kecil dan Menengah di Daerah Istimewa Yogyakarta , working paper , LPPM Universitas Atma Jaya Yogyakarta, Yogyakarta.

[33] Purves M., Sambells J., and Turner C, 2006, Beginning Google Maps Applications with PHP and Ajax , Apress, Berkeley, CA.

[34] Rebhan, George, 2007, The Evolution of Geocoding: Moving Away from Conflation Confliction to Best Match , dari situs http://www.directionsmag.com/printer.php?article_id=2492 , diakses 12 Maret 2009.

[35] Rod, JK, Ormeling, F. & Elzakker, CV, 2001, An agenda for democratising cartographic visualisation , Norsk Geografisk Tidsskrift-Norwegian Journal of Geography , 55 , 38-41.

[36] Ross, KS, McCabe, CA & Roth, RE, 2009, A near real-time visualization for understanding spatio-temporal patterns of violent crime in the District of Columbia , The Department of Homeland Security Summit , Washington, DC

[37] Sackett, P., Rose, T., dan Adamson, V., 2003, The Importance of Business Process Classification with in Virtual Enterprise , Journal of Small Business and Enterprise Development, 10(3), 298 – 305.

[38] Scharl, A, and Tochtermann, K, 2007, The Geospatial Web: How Geobrowsers, Social Software and The Web 2.0 are Shaping the Neetwork Society , Springer, Berlin, Germany

[39] Simpson, M. dan Taylor, N., 2002, The Role and relevance of Marketing in SMEs: Towards A New Model , Journal of Small Business and Enterprise Development, 9(4), 370 – 382.

[40] Spence, LJ, dan Rutherford, R., 2001, Social Responsibility, Profit Maximization and The Small Firm Owner-Manager , Journal of Small Business and Enterprise Development, 8(2), 126 – 139.

[41] Stone, M., 2003, SME e-Business and Supplier-Customer Relations , Journal of Small Business and Enterprise Development, 10(3), 345 – 353.

[42] Suyanto, M, 2005, Multimedia Alat untuk Meningkatkan Keunggulan Bersaing , Penerbit Andi, Yogyakarta.

[43] Suyoto, 2008, Pengembangan Sistem Informasi untuk Usaha Mikro, Kecil, dan Menengah pada Industri Handcraft di Daerah Istimewa Yogyakarta , Laporan Penelitian Hibah Bersaing 2008 (Unpublished), Fakultas Teknologi Industri Universitas Atma Jaya Yogyakarta, Yogyakarta.

[44] Tse, T., dan Soufani, K., 2003, Business Strategies for Small Firms in the New Economy , Journal of Small Business and Enterprise Development, 10(3), 306 – 320.

[45] Wicaksono , 2008, Pembangunan Sistem GPS Mobile Phone Tracker with Google Maps API, Skripsi Program Studi Teknik Informatika (Unpublished) , Universitas Atma Jaya Yogyakarta, Yogyakarta.

[46] Wood, J., Dykes, J., Slingsby, A. & Clarke, K., 2007, Interactive visual exploration of a large spatio-temporal dataset: Reflections on a geovisualization mashup , IEEE Transactions on Visualization and Computer Graphics, 13 , 1176-1183.

[47] Wood, M., 2003, Some personal reflections on change...The past and future of cartography , The Cartographic Journal , 40 , 111-115.

[48] Zang, N., Rosson, MB & Nasser, V., 2008, Mashups: Who? What? Where? , Conference on Human Factors in Computing Systems (CHI '08) , Florence, Italy, ACM.

[49] Zhang, Jingyuan, Hao Shi , Yanchun Zhang, 2009, Self-Organizing Map Methodology and Google Maps Services for Geographical Epidemiology Mapping , 2009 Digital Image Computing: Techniques and Applications , pp. 229-235.