ISSN 2348 – 8034
Impact Factor- 5.070

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

WEB BASED DSS FOR OPTIMIZING SOCIAL CAPITAL OF RURAL MASSES (WITH SPECIAL REFERENCE TO GROUP & NETWORKS AND TRUST)

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ABSTRACT

Information and Communication technologies (ICTs) can be used for community development efforts, refers to this new field of study as community informatics, an approach that links community development efforts with the opportunities that ICTs present. Social Capital is a part of community informatics that includes the feature of social organization such as social networks, norms and trust that facilitate co-ordination and coordination for mutual benefit. Now day's social software are utilized for group communication and collaboration which foster to build and manage social networks.

The present paper focuses on that if a person of any HSG have a better social capital he/she will be suitable for assisting each member in creating or seeking a network of friends, acquaintances, people who share the same interests or are of interest to the member **(Eagle & Pentland, 2005; Tindall & Wellman, 2001)**. Access to the social networking platforms might be restricted to invitations by existing members only. network by inviting others to join and connecting with others. The present study is focused on formulating a web based decision support system for accessing relationship between the water developmental process and social capital.

I. INTRODUCTION

In recent years, the management of natural resources has become an increasingly challenging issue for several reasons. The complexities inherent in the management of natural resources require the integration of scientific knowledge and economics with social problems. In a complex framework, Decision Support Systems (DSS) attract the attention of policy makers as potentially effective tools in support of water resources management, with a specific role to be played for the integration of the multiple disciplinary components, while considering multiple objectives. Decision analysis plays a fundamental role when problems are complex and dynamic. So there is a need to develop and transfer such methodological approaches, which can support the implementation of transparent planning/management processes to meet policy/decision makers' requirements and achieve more robust and informed decisions **(Geertman & Stillwell)**. The "traditional" knowledge in physical /environmental sciences must thus be integrated with sound economic methods, but also with methods borrowed and adapted from sociology, information and communication sciences and other disciplines **(Coelho, Labadie & Fontane, 2012; Kunstmann et. al. 2008; Prasad, Strzepek & Koppen, 2007; Siebenhuner & Barth, 2005).** Social Capital is a part of community informatics that includes the feature of social organization such as social networks, norms and trust that facilitate co-ordination and coordination for mutual benefit. It is expected that communities can help to targeted practitioners to develop social capital, nurture new knowledge and stimulate innovation. Now day's social software are utilized for group communication and collaboration which foster to build and manage social networks.

Social Capital and Community Services

In recent years, there have been some remarkable shifts in policy in many parts of the world regarding natural resource management with an emphasis on collective approaches to the formation of social capital at community level. In many circumstances, social capital can be considered as a pre-requisite for the sustainable management of natural resources **(Pretty, 2003)**. It empowers people in meaningful ways to pursue conservation objectives **(Dale & Sparkes, 2007)**.

By fostering social capital people can be prompted to act at a community level and to work together for mutual benefit on environmental initiatives **(Miller & Buys, 2008)**. Investment in social capital yields both tangible returns for market (e.g. income, wages) and non-market (e.g. health, social status) outcomes **(Godoy et al., 2007)**.

Social computing gave a new approach for social networks and their relationship. Social computing shifts computing to the edges of the network and empower individual users with relatively low technological sophistication in using the Web **(Pigg and Crank, 2004)** to manifest their creativity, engage in social interaction, contribute their expertise, share content, collectively build new tools, disseminate information and propaganda, and assimilate collective bargaining power **(Dynes, 2002)**.

II. REVIEW LITERATURE

In the 1960s, researchers began studying the use of computerized quantitative models to assist in decision making and planning for community services **(Raymond, 1966; Turban, 1967)**. **Ferguson and Jones (1969)** reported the first experimental study using a computer aided decision system. **Scott Morton's (1971)** study is involved building, implementing and then testing an interactive, model-driven management decision support system. During 1966, he studied how computers and analytical models could help managers make a recurring key business planning decision. The study of decision support systems for complex community decision making is performed by many researcher **(Baskerville & Myers, 2002; Keen, 1980; Sprague and Watson, 1979; Gorry and Scott-Morton's, 1971; Little, 1970; Keen and Scott Morton, 1978, Alter, 1977; Donovan and Madnick, 1977; Sprague and Carlson, 1982; Alavi & Joachimsthaler, 1990, Eom & Lee, 1990a, Eom, 2002; Power & Sharda, 2009; Armstrong et. al., 1986; Crossland et. al., 1995; Bhargava et. al., 1997, Arnott and Pervan, 2005)** and they found that social computing empower not only groups but also individual user with relatively low technological sophistication in using the Web to manifest their creativity, engage in social interaction, contribute their expertise, share content, collectively build new tools, disseminate information and propaganda, and assimilate collective bargaining power **(Dynes, 2002)**.

III. RESEARCH METHODOLOGY

In the constitution and functioning of SHGs, there is a wide variation observed among the SHGs regarding membership, attendance, Neighbours and village member's closeness and their behaviours, relationship from friends and members of other SHGs and related regulations.

Sampling and data collection

Multi-stage, simple random sampling method was used for selecting the SHGs and respondents. Thus a total of 170 members out of 18 SHGs are selected for the study. Interview schedule was used for primary data collection.

Data analysis and Modelling

Regression analysis is performed to know the behaviour and trend of data. For optimizing data, neural network (Levenberg-Marquardt optimization, a neural network method for optimizing a multi-layer process, is used in the optimization of social operations) and genetic algorithm's functions are used in MATLAB environment.

Architecture of Developed Web DSS

The Web DSS architecture consists in a Web server, a Data Base and an Internet connection. The decision maker uses a Web browser to send a request to the Web server with the help of a transfer protocol (HTTP). The Web server processes the request using a program or a script. The script may implement a model, a data base request or a document. The results are redirected to the user's Web browser for display. There is Web applications especially designed to allow an authorized user to interact with the results.

The application code resides on a remote server and the user interface is presented at the client's Web browser objectives and implies action. The web based decision support has been divided into four modules which are user registration module, login module, data and information module and optimization & decision making module. A threetier client / server approach is adopted in web based DSS design named Presentation Tier (Client Tier), Business Tier (Application Server Tier / Web Tier), Data Tier (Data Server Tier)

IV. RESULTS AND DISCUSSION

The developed web based DSS is based on groups and networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion and empowerment and political action. All indicators are optimized using neural network. The goodness of fit statistics helped to determine how well the curve fits the data.

The confidence intervals on the coefficients determine their accuracy. The sum of squares due to error (SSE) and the adjusted R-square statistics are used to determine the best fit. The SSE statistic is the least squares error of the fit, with a value closer to zero indicating a better fit. The adjusted R-square statistic is generally the best indicator of the fit quality when additional coefficients are added in a model. The analysis and the model developed are discussed in the proceeding headings

Table 1 : Neural network performance for web based DSS

S.No	Name of Indicator	Correlation		Performance	Epoch
1.	Groups & Networks	**Training**	0.992374	9.0414×10^{-4}	14
		Validation	0.991843		
		Testing	0.990029		
2.	Trust and Solidarity	**Training**	0.981630	1.566×10^{-3}	51
		Validation	0.994031		
		Testing	0.992250		

Table 2: Best linear fit equation for neural network training

S.No	Name of Indicator	Best Linear Fit for Training
1.	Groups & Networks	$T_r = (0.98)T + (2.1)$
2.	Trust and Solidarity	$T_r = (0.97)T + (1.8)$

Table 3: Best linear fit equations for neural network validation

S.No	Name of Indicator	Best Linear Fit for Validation
1.	Groups & Networks	$V_{ag} = (0.99)T + (1.4)$
2.	Trust and Solidarity	$V_{at} = (0.97)T + (2.7)$

Table 4: Best linear fit equations for neural network testing

S.No	Name of Indicator	Best Linear Fit for Testing
1.	Groups & Networks	$T_{egs} = (0.98)T + (3.6)$
2.	Trust and Solidarity	$T_{ets} = (0.99)T + (0.33)$

Groups & Networks

The rate of change of groups and networks as a function of group size is presented in the graph which bring out the fact that as the group size increases, the rate of change which is highest at the small sized group tends to become

ISSN 2348 – 8034
Impact Factor- 5.070

constant (0.08 approx) at a group size corresponding to 130 members. After which addition of members will not affects the contribution of individuals in group dynamics.

The groups and networks dynamics yields that the minimum. The results of DSS employ that in case of water sustainability and management rate of change in groups and networks depends on leadership, group decision making, economic status, social assistance & credit within the group, survivalness, similarity and time/money & labour contribution etc.

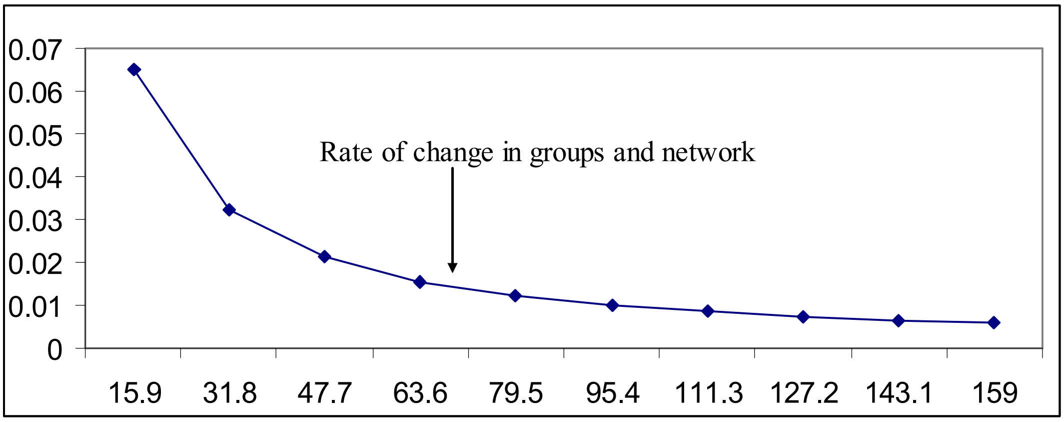

Figure 4: DSS characteristics for the indicator of the groups and networks

Trust and solidarity

The analysis shows that trust is an important factor for team performance. Different aspects of a team's organization can serve to increase trust among its members for community related problem like water sustainability and sanitation. The graph express that the change in trust and solidarity level is moderately higher at small group values which letter becomes almost constant or slightly increasing in the latter part. It can be concluded that at group value corresponding to 63, the change in trust is almost insignificant and this value corresponds to minimum threshold value of trust for the group.

The affecting factors of trust and solidarity for resolving community problems are found familiar personality, social confidence, public relation, level of trust and dependency and contribution among group's member.

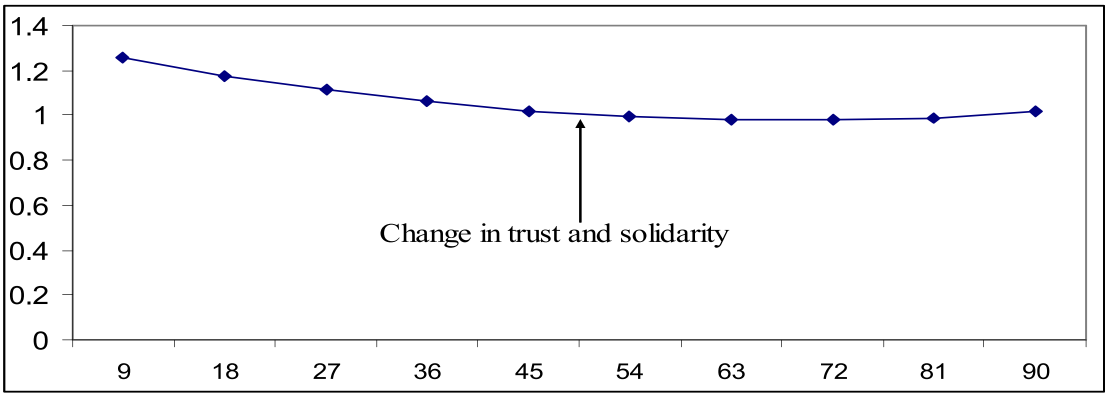

Figure 5: DSS characteristics for the indicator of trust and solidarity

V. CONCLUSION

The DSS provides information on the outcomes concerning participation and, more broadly, the human dimension. It is evident in this regard that the quality of the DSS results is determined by the quality of the management of the decision processes. Similarly, the usefulness of the outcomes depends on the quality of the communication and training strategies. Experience shows that there is not a single recipe for the success of DSS developments, but many necessary ingredients related to participation are known, such as the early involvement of end-users and the flexibility of the tools in considering their needs. The DSS should be structured within methodological frameworks in which all the phases and components of the policy/decision-making process are considered. Protocols and standards for technology integration and interoperability could significantly contribute for technology transfer and for the development of DSS.

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