Developing a Framework for Social Informatics Research: A Systematic Literature Review

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Abstract

With the fast proliferation of internet protocols with infiltration of smart devices, information and communication technology (ICT) is changing every aspect of our work and life. Social informatics is a discipline of interdisciplinary investigation concerning changes incurred by ICT. The scope and boundary of social informatics being an emerging field of investigation have not yet been adequately defined due to its broad and ambiguous nature. The purpose of this study is to develop a conceptual framework for social informatics research based on a review of actual studies from the perspective of our work and life. Content analysis was performed to extract keywords and categories from research articles published in major academic journals related to social informatics within the last decade. A conceptual framework is surfaced with four major categories (Technology & Use, Government, Level of Context and Social Issues) and 13 subcategories. In conclusion, the direction of social informatics research is proposed and implications are discussed with limitations of the study.

Keywords: Social Informatics, Content Analysis, Conceptual Framework, Technology & Use, Government, Level of Context, Social Issues

1. Necessity of the Study

As the internet becomes part of everyday life and with the creation of environments where the World Wide Web (WWW) can be accessed by a smart device anytime, anywhere, dramatic changes are occurring in our lives and in the way we have worked [1]. These changes that appear with the use of information and communication technologies (ICTs) will not only influence the job performance of workers and the productivity of organizations, but will also create ripple effects in every aspect of society and culture and set a new paradigm for our time[2]. Accordingly, social effects due to the changes in work practices should be considered more thoroughly, with the overall impact of ICT being discussed in different contexts [3][4]. However, there have been few organized attempts to analyze how those outcomes of the information revolution spread out and work in society and which parts of society they influence.

Social informatics is the scientific study of the social aspects of ICTs. Kling [5] defines social informatics as the interdisciplinary study of the design, use and outcome of information technologies, with consideration for the interactions between information technologies and their institutional and cultural contexts. This definition of social informatics emphasizes the key idea that information technologies do not exist in isolation from society. The cultural and institutional contexts affect the ways that information technologies are developed, the kinds of workable computer configurations that are proposed, the ways that computers are built and used, and the consequences the technologies has for organizations or other social groups.

The outcome of social informatics research is marked by its keywords rather than theories or methodologies used in the research [5]. The perspectives of analyzing the social impact of ICT can be divided into three main approaches: normative, analytical and critical orientations [6]. The normative
orientation refers to research that aims to propose alternatives for professionals who design, implement or use information technologies or make policies about the technologies. The analytical orientation refers to empirical research that develops theories about information technologies in institutional and cultural contexts or is designed for such theorization. The critical orientation means researching information technologies from the perspective of not unconditionally and uncritically accepting the goals and beliefs of groups that commission, design or implement specific information technologies. The critical orientation is possibly the most novel work [7].

Until recently, no active discussion has taken place as to the efforts to differentiate social informatics conceptually and clarify its scope academically. As a matter of fact, there is some difficulty in such efforts because social informatics is not fully covered by many different academic disciplines and the word “social” is too broad to define its conceptual scope. During a workshop, Kling and 25 other scientists portrayed the scope of social informatics by proposing a conceptual framework as shown in Figure 1 [4].

![Triangle Model of Social Informatics](image)

**Figure 1. Triangle Model of Social Informatics**

The triangle model and concept of social informatics are useful in emphasizing the key idea that information technologies do not remain isolated socially and technologically [8]. In the triangle model, the technology represents information technologies; the institutions include societies, markets, social communities, organizations, groups, households, processes, procedures, rules and tasks; and the culture refers to values, norms, talks, discourses, pop culture and artifacts. These institutional and cultural contexts influence the ways of developing information technologies, the forms of their configurations, the methods of their implementation and use, and the set of their consequences for organizations and other social groups.

However, the presented conceptual framework is rather abstract and we could find nothing as to whether research had been conducted within the actually defined scope. Furthermore, there is a need for presentation of another conceptual framework that is based on research results applicable in such disciplines as business informatics. Therefore, the present study intends to analyze research findings from journals for social informatics, propose a framework based on recent studies of social informatics and compare it with the existing triangle model.

## 2. Methodology

The representative international journals for social informatics include the Information Society; Information Technology & People; Information, Communication and Society; New Media and Society; the Journal of the American Society of Information Science; and the Annual Review of Information Science and Technology [6]. In this study, we selected the Information Society with the highest impact factor out of those journals for social informatics and referred to articles published in recent ten years (2003-2013) in order to read the tendency of the selected journal. A total of 276 articles including...
perspectives on the information society were used except those in the journal’s special issue for Rob Kling.

This study conducted a keywords-based content analysis to propose a conceptual framework for social informatics. We analyzed keywords from 276 articles and used a three-stage approach for keyword classification. The primary aim of the first stage was to extract keywords from the abstracts of the journal articles. They were mostly extracted from the key phrases of individual sentences with a focus on the subject matter of each article. Four researchers (two with a doctorate and two in the doctoral program) were invited to read the abstracts for keyword extraction and compare the extracted keywords among them. A total of 543 keywords were extracted in that manner. Abstracts are often characterized by using simplified expressions or listing some specific findings, because they are short summaries of the content of articles. Accordingly, when it was difficult to understand or extract keywords among them. A total of 543 keywords were extracted in that manner. Abstracts are often characterized by using simplified expressions or listing some specific findings, because they are short summaries of the content of articles. Accordingly, when it was difficult to understand or extract keywords from abstracts, researchers were encouraged to read the full texts to set keywords.

### Table 1. Distribution of Keywords by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
<th>Level of Context</th>
<th>Government</th>
<th>Issues</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tech</td>
<td>Use</td>
<td>Society</td>
<td>Life</td>
<td>Politics</td>
</tr>
<tr>
<td>2012</td>
<td>4</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
<td>7</td>
<td>11</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>10</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2008</td>
<td>11</td>
<td>16</td>
<td>12</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2007</td>
<td>9</td>
<td>14</td>
<td>8</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>5</td>
<td>24</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>2005</td>
<td>5</td>
<td>16</td>
<td>5</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2004</td>
<td>1</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2003</td>
<td>4</td>
<td>13</td>
<td>5</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>sum</td>
<td>48</td>
<td>103</td>
<td>90</td>
<td>67</td>
<td>38</td>
</tr>
</tbody>
</table>

In the second stage, the extracted keywords were filtered by a team of four professionals. Each keyword was presented on a card, and identical concepts were categorized and grouped together. As a result of this categorization, the keywords were organized into 17 groups, but their concepts were reorganized for the purpose of this study by combining similarities or overlaps between groups. Based on the primary classification, the abstracts of all articles were read again for keyword reclassification. Ultimately, a list of 397 keywords was created by reorganizing keywords based on the established classification criteria. The 17 keyword groups consisted of four main categories and 13 subcategories. A conceptual framework for social informatics was finally presented. Table 1 shows the year-by-year distribution of keywords from the Information Society articles.

The “technology & use” category accounted for a very high proportion of the extracted keywords (44.4%) with 103 keywords under the “application” subcategory, 90 under “ICT use” and 48 under “technology.” The keywords included in the “level of context” category (31.7%) were distributed at a similar proportion amongst its subcategories: society (67), policy (45), life (38) and culture (22). The "issues” category (13.8%) was found to have the largest number of keywords under the “digital divide” subcategory (38), followed by “abuse” (19), “power shift” (12) and “human agency” (6). The “government” category (10.1%) included the smallest number of keywords with 36 and 19 under the "development” and “regulation” subcategories, respectively.

As indicated in Table 1, the keywords from the initial articles are concentrated mainly on the “level of context” category, but since 2006 the keywords under the “technology” category represent a very large share of the extracted keywords. The subject matter of articles published in 2003 and 2004 seems mainly related to political decision-making or government policy, and in 2005 the keywords under the “application” subcategory make up a large part of the extracted keywords. For the articles of 2006-2012, a large share of the extracted keywords is represented by “ICT use” in 2006, “policy development” and “application” in 2007, and “technology” and “government development” in 2008, 2010 and 2012. However, in 2009 and 2011, the keywords are relatively evenly distributed among subcategories. Figure 2 shows the distribution of categorized keywords.
3. Analysis Results

3.1 “Social Informatics” Framework

As shown in Figure 3, keywords about social informatics extracted from the Information Society articles of the last ten years were classified into four main categories (i.e., technology & use, government, level of context and social issues) and 13 subcategories.

The “technology & use” category consists of three subcategories which are technology & tools, application and use. The “government” category has two subcategories, namely development and regulation, and the “level of context” category is defined by policy, society, life and culture. The keywords under the “social issues” category are reclassified under one of the following subcategories: power shift, abuse, digital divide and human agency.

3.2 Technology & Use

The definition of informatics in the Oxford dictionary is “the discipline of science which investigates the structure and properties (not specific content) of scientific information, as well as the regularities of scientific information activity, its theory, history, methodology and organization.” In other words, the main scientific goal of informatics is to study the nature of information in different forms, which leads to the use, understanding, storage, accumulation, classification and organization of information [9].
The primary criterion of informatics classification is technology and use. Keywords under subcategories of this domain are as follows: First, the “technology & tools” subcategory included keywords that can be characterized as ICT in a broad sense, such as broadband ICT, ICT, diffusion technology networks and associated tech, cultured technology, and information structure. When the scope of technology was defined more specifically, the “technology” keywords were classified as mobile-related technologies (community wireless networks, mobile phones, SMS, and text messages), internet technologies (internet, FTTH, instant messaging, top-level domains, internet connectivity, search engines, and video tax), social networking technologies (end-user social technology), security and recognition technologies (smart devices, and personal identifiable information), or storage technologies (electric data archiving).

Second, applications can be characterized as application solutions based on technological details. ICT-based applications consisted of online technologies such as the willingness to pay (WTP), computer-mediated communication, map-based application, Google Print, Argument MAP Chat room, simulation (Cyberfrog), Frog Dissection, Inforgs, mediated communication, Napster’s impact, and e-authentication.

In terms of digital content that is served by means of ICTs, typical keywords include computer news, digital broadcasting, digital contents, digital media, digital music, digital resources, intellectual property rights, and relations dynamics.

In connection with social issues, a wide variety of application solutions were found and divided into the following areas: health-related application solutions (healthcare management/nursing, e-community care service, health care devices, and health information systems), security and disaster (Decode Content Scrambling System (DeCSS), emergency response service, and disaster management), artificial intelligence (artificial intelligence, machine intelligence, and knowledge repositories), software (open source software, and embedded technical expression), and home computing (home computing, and home technology), and additionally e-commerce and e-government.

Finally, the ICT use was divided into three forms: technology use, technology adoption and technology access. More specifically, the technology use is characterized as the use of the internet, ICTs and mobile phones; the sharing of information, knowledge and data; or the resulting experience. The technology adoption was distinguished between the adoption of new mobile technologies and of information technologies (e.g., ATM). The keywords about technology access were classified in terms of the technology accessibility of people with disabilities or those who had difficulty using digital information.

3.3 Level of Context

Social informatics is characterized by the interactions of information technologies with institutional and cultural contexts. Based on an analysis of texts on such interactions, we classified the “level of context” keywords under one of four subcategories: society, life, policy and culture.

The “society” category included keywords about society being used online or in cyberspace (e.g., online community, cyber society, network logic, network society, networked community, online social relations, e-society, and virtual community) and others being used in broader and real communities (e.g., community informatics, citizen networks, civil society organizations, information society, institutions for managing knowledge, social relationships, nation context, and network organizations). In addition, this subcategory included keywords about participations and activities occurring in various communities (e.g., informational organisms, community participation, open source software movement, patients’ online communities, library community, community of practice, and internet scholars).

The keywords under the subcategory “life” are mostly terms that are relevant to changes in everyday life made by ICTs. They included words and phrases about life changes, lifestyles, life reality, chain of being, or relations in life. The subcategory “policy” consisted mainly of keywords about policy-making or decision-making activities and ICT-related policies in different sectors. This subcategory also included keywords that represent political differences over policies and different political views associated especially with social status. Most of the keywords classified under the “culture” subcategory included words that are relevant to cultural changes resulting from the use of ICTs (e.g., computer and digital) or cultural differences caused by social relations (e.g., disability, language, political, religion and youth).
3.4 Government

In this study, the government refers to an administrative authority which makes, enforces and/or controls policies. Actually, ICTs do not only create social effects, but also influence many aspects of government policy. That’s why we set the “government” domain as a main category. The category consisted of two subcategories: development and regulation. The “(government) development” subcategory covered keywords pertaining to the development of industrial clusters and to the development of developing countries (i.e., informatization campaigns, informatization development and investment, NGO activities and accumulation of social capital). The keywords included in the “regulation” subcategory are words and phrases that relate to regulations or laws on ICT policy matters. The regulations on policy matters were presented as keywords classified in terms of ICT policies, trust and security, and regulatory changes, and the keywords relating to laws were classified in terms of freedom of information, digital copyright and nation security.

3.5 Social Issues

The social impacts of the use of ICTs constitute the topics of social informatics studies which are discussed as social issues. The social issues resulting from the use of ICTs help determine whether or not the studies are within the scope of social informatics, in that they are the ultimate issues for the studies to resolve. Through an analysis of keywords from the Information Society articles, we further divided this “social issues” category into four subcategories: power shift, digital divide, human agency and abuse. The keywords under the subcategory “power shift” are terms that have been coined or emerged as the social participation of individual increases with the popular use of ICTs and as the central axis of decision-making changes through diverse expressions. The subcategory “digital divide” included keywords that refer to discrimination-related issues including the limited ICT accessibility of socially-disadvantaged people have using ICTs, sexual discrimination and linguistic discrimination. The subcategory “human agency” included keywords that relate to the issues of conflict that take place in the relationships between humans and information technology, especially about the replacement of humans by machines and complicated relationships between technology engineers and users. Finally, the abuse of ICTs was represented by keywords about privacy invasion, online scams/frauds and software crimes.

4. Discussion and Conclusions

In order to find a conceptual framework for social informatics, this study extracted keywords from the abstracts of articles published in the Information Society for a period of 2004-2012 and invited a team of four professionals to conduct an analysis of the extracted keywords. Based on the results of their analysis, the keywords were classified into four main categories: technology & use, government, level of context and social issues. The keywords under the “technology & use” category were further classified under one of the subcategories of technology & tools, application and use. The “government” category was divided into two subcategories, i.e. development and regulation; the “level of context” category was defined by four subcategories, i.e. policy, society, life and culture. The keywords included in the “social issues” category were reclassified under one of four subcategories: power shift, abuse, digital divide and human agency. Based on the results of this study, the authors make some suggestions in comparison of the triangle framework model presented by Kling et al. [5].

First, a framework of relationships between technology and institutional and cultural contexts was organized with a focus on their actual content. The existing triangle model comes up with ideas that help explain social implications through diverse combinations of technology, institutions and culture, whereas the proposed framework of this study represents such a model that is construable in terms of technology use, government development, and regulations. Previous studies failed to provide clear explanations of the concepts of institutions and culture in a broad sense and of the term “interactions” which refers to the combinations of technology with institutions and culture.

Second, this study concretely documents that the nature of interactions encompassing political, social and economic contents is defined as a set of four constructs: policy, society, culture and life. In
discussing the principles of interactions, it is impracticable to rely on a single axis of policy, society or economy and research in reality involves a variety of different topics in a combined manner.

Third, the triangle framework model makes no distinction between issues as main outcomes or targets. Social issues with information which have been raised over the last five years are the targets that quantitative studies attempt to report ultimately along with their dependent variables. The diversity of those social issues would be an essential topic for the discipline of social informatics to be academically promoted, and it is therefore necessary to present social issues in a diverse way.

The findings of this study suggest that the impacts of information systems on society should be further discussed in depth. Since the impacts of existing information systems have been mainly limited to the internal functions of organizations, most of the related studies have focused on organizations’ or individuals’ matters of interest. Meanwhile, new forms of work such as smart work where the use of ICTs helps increase the flexibility of time and space will contribute to extending the physical scope of workspace and expanding the nexus of interactions in social, cultural and institutional domains, and accordingly they will bring great ripple effects to society [10]. There have not been many attempts to study the information systems in connection with their impacts on society. Future studies need to examine the information systems in wider areas of society, culture, politics and regulation as well as at individual and organizational levels but social.

This study has some limitations that should be addressed in future research. Only one journal was employed for the development of the proposed framework. A comprehensive analysis of different journals for social informatics should be conducted to see the specific trends of research. Another limitation is that the analysis methodology was limited to a keywords-based content analysis. To make up for this problem, a mathematical analysis of article abstracts needs to be carried out together. This will help elicit ideas for social informatics research. Further, the proposed framework should be discussed with experts in social informatics.

5. Reference

### Appendix. Keywords Classified by Categories

<table>
<thead>
<tr>
<th>Technology &amp; Use</th>
<th>Technology &amp; Tools</th>
<th>Application</th>
<th>Use</th>
<th>Level of Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalizing age, Daily life, Change in new media, Chain of Being</td>
<td></td>
<td></td>
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<td>---</td>
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<tr>
<td><strong>Culture</strong></td>
<td>Youth cultures, Social culture, Role of cultural factors, Religious fundamentalism with internet, Religion online, Political culture, Mutual Shaping Lens, Modernity culture, Modernity, Language and Culture of systems, information-media culture, Information as culture, History of ideas, Disability culture, Digital culture, Cultural economic geography, Culture of research and teaching, Culture of ICT adoption, Culture conflict, Cultural dimensions of mobile, Cultural differences, Computer culture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Issues</strong></td>
<td>Power shift</td>
<td>Self-exclusion, Professional Identity, Power transform, Political participation, Media shrinking, journalism, Internet Scholars, Identity debates, Freedom of Expression, Educational Participation, Digitalization, Community participation, Citizen Participation in Democratic Decision making, Citizen Participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human Agency</strong></td>
<td>Nonhuman Agency, Knowledge labor, Human supplement, Human agency, Computer literacy, Complex relationship between Designer and users</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital Divide</strong></td>
<td>Technological controversy, Social Barrier to ICT Work, Language difference, Intellectual Disabilities in Web, Gender Divide, Entry Barrier, Digital inequality, Digital divide, Digital disability, Digital cultures and divides, Difference in Communication Use, Accessibility issues, Accessible ICT to disabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Abuse</strong></td>
<td>Technology abuse, Software Piracy, Security, Protection informational privacy, Privacy issues, Privacy concern, Online Crime, Need for privacy, lack of exposure, internet privacy, Intellectual Property rights, intellectual and cultural property, Information and computing ethics, illegal sharing of materials, ethic of information, Deception, cyberspace control, Copyright, conflict Human and machine, Community Privacy</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>