

User as Innovator in IT development process

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Abstract—In this paper, the benefits of user participation in value creation in the information technology (IT) development process are discussed. The literature studies allow for the conclusion that user role is very important and new methods are developed to increase user participation. The research results indicate that the user participation, although requested, is limited, therefore in the paper some changes are suggested.

Keywords—*innovation; lead user; user centered design; user experience; user participation*

I. INTRODUCTION

Encouraging users to be value creators in IT development processes is an important step in the competitive effectiveness increase activity. Many authors argue the user involvement in IT process is critical for IT implementation success because under the service-dominant logic users are contributing to the process of IT exploitation.

According to Claycomb et al. [12] users can actively participate in creating a solution, when IT service failure occurs by applying specialised skills and knowledge. For example a user can diagnose their laptop problems based on the product's user manual. Research on user participation so far has focused on how to employ users to increase productivity in the service delivery context [18]. The purpose of this research is to bridge the gap in the literature by investigating user participation in IT development process and to present some suggestions on users' future co-creation behaviours. The paper is to show that nowadays users are no longer passive audience, but under certain circumstances they are active co-producers. Williford [27] has noticed that for many years, the computer-literate users developed simple applications to increase their personal productivity. User applications development has evolved to include complex application development by groups of users and shared across departmental boundaries. However, there still prevails a common mistake that user applications are not significant, transient, disposable as not production-oriented.

In 2009, Anderson [2] had noticed that in the markets, there are a lot of niche goods, the costs of reaching them are going down because of the IT development. Anderson [2] argues that for long-term demand development is the democratizing the tools of production. So, individuals can do now what just a few years ago only professionals could do. He argues that now people have the tools and the methods to

become amateur producers. Some of them have talent and vision, so they are able to produce by and for themselves.

The main problem of the paper is to explain the role of users as innovators in the business information system process. The paper consists of two main parts. The first covers analysis of the works from other researchers on user innovativeness and on user participation methods. The second includes considerations connected with empirical research on the user different activities, strong points and weaknesses of their behaviours. The further research could cover explanation of users attitudes differentiation according to the industry.

II. CUSTOMERS AS INNOVATORS

Innovation can be seen as a management activity, which involves focusing on the organization's mission, searching for unique opportunities, determining whether they fit the organization's strategic directions. Innovators look to the future with knowledge of the past. They are expected to deliver something new - new products, new processes and new designs, which create change in goods as well as in lifestyles. Roberts and Frohman [21] generalize that innovation is an invention plus the exploitation. The invention process covers all efforts aimed at creating new ideas and getting them to work. The exploitation process includes all stages of commercial development, application and transfer, including the focusing of ideas or inventions toward specific objectives, evaluating these objectives, downstream transfer of research and development results, and eventually a broad-based utilization, dissemination and diffusion of technology-based outcomes.

Tidd and Bessant [25] argue that innovation is driven by the ability to see connections and opportunities and to take advantage of them. The creativity in innovations adds value to the individual and the community and is based upon perceiving and capturing an opportunity. They consider four types of innovations:

- Product innovation - changes in the products or services that a business organization offers.
- Process innovation - changes in the ways in which they are created and delivered.
- Position innovation - changes in the context in which the products and services are introduced.

- Paradigm innovation - changes in the underlying mental models which frame what the business organization does.

The innovation process consists of an idea that comes from some recognized need that is developed into a concept, followed by invention and then taken through development, production, diffusion and adoption by end users. The innovation process will be guided by the type of innovation, the importance of innovation, the elapsed time and expected time of introduction, sources of innovation, the character of the organizational infrastructure, and the number of technology and market unknowns. There are many models of innovation process [19], [24], [25]. All of them emphasize the necessity to recognize the opportunity and through the research and design transform it into a market product.

IT innovation as any innovation demands the co-evolution and co-existence of the information technology invention and the business process of any organization. Innovations are realized in the context of socio-economic institutions. The object of IT innovation does not stand alone, but is set in the economy, cultural and business practices, social values and interests. Innovation research has emphasized the importance of understanding user needs in the process of new product development. However, it is not sufficient to understand or even satisfy existing customers, but rather it is necessary to lead existing customers and create new customer segments. Therefore, companies could be interested in customer involvement in production or service delivery process. Customers are expected to support companies to reduce research and development costs, to differentiate services, reduce the time to market, facilitate user education, improve market acceptance, or even to provide more original and valuable proposals than professional developers. General classification of customers in IT sector covers lead user, normal user and user community [3], [15]. Lead users are critical to the development and adoption of complex products. They demand innovations ahead of the general market of other users. They face needs that will be the future trends in the market place and they are actively engaged in the innovative process. Normal users could help to provide superior and differentiated services, reduce cycle time, increase acceptance of the new service. Community users are interested in technological products and they play important role in advance of technologies [23]. Communities are treated as a decentralized virtual design teams, as designers and as a source of innovations. Websites such as Twitter, Facebook, MetaCafe, Wikipedia, Flickr among others, have all been introduced within the last decade and rapidly grew in user communities. Organizations are beginning to invest time and effort in developing a social media presence e.g. on Facebook, to capitalize on a growing user population that is interested in creating, retrieving, and exploring the Websites. Organizations are beginning to realize the potential benefits that can be captured when users and organizations co-create value. Users benefit from their positive experience that fulfils personal needs and interests. Experience is defined as

an intense individually involved event. Designing for use and testing by use are the essential characteristics of user-innovators; they may subcontract production and parts supply. The user-innovators are motivated by the users' own desires for a better product. However, there is a risk that the user involvement in the design process will never be properly rewarded and an organization fails to provide a positive user experience, so the negative consequences can occur such as negative publicity and loss of user engagement. Therefore, only through the social interactions, perceived dialogue online and social accessibility and transparency the value can be co-created. Some initiatives have institutional backing involving professional staff, others build on communities of practitioners and rely on their voluntary work. Repositories can be organised as a place to share and exchange resources, which means that people are either users or producers, or they can promote the collaborative production of common resources. There are a couple of models of open collaboration:

- User-producer model: centralized model, although real costs can be met with resources other than money, most initiatives need to raise some capital.
- Co-production model: equal participation,
- The replacement model, open content replaces other uses and benefits from cost savings.
- The foundation, donation or endowment model in which funding for the project is provided by an external actor.
- The segmentation model, in which the provider offers value-added services to user segments and charges them for these services.
- The conversion model, in which "you give something away for free and then convert the consumer to a paying customer".
- Membership model, voluntary support model, based on fund-raising campaigns or paying members [13].

In innovation process, customers are perceived as having an integral pro-active role in collaboration to innovate. Bhalla [8] discussed the changed profile of the new customer (see Table I).

TABLE I. CUSTOMER PROFILE CHANGES

	Classic Management Organization	New Economics Organization
Identity	<i>Consumers, Recipients</i>	<i>Creative Partners</i>
Role	Passive	Active Collaborators, Co-producers of Value
Source of Insights	Surveys, observation of customers	Conversations, online comments
Relations with company	Transaction-based	Experience-based
Location	Fixed and visible customers	Virtual customers
Influence media	Advertising, expert opinions	Social media, peer-to-peer
Source of value	Company offers	Customer preferences and experiences

Source: [8].

For many years mass production and product customization were business strategies that aimed at fulfilling individual user needs quickly and efficiently. However, concepts such as customer orientation, user centered design, close to the customer, customer segmentation, customer relationship management reveal the importance of the user involvement.

III. USER PARTICIPATION METHODS

Barki and Hartwick [4] proposed a distinction of user involvement from user participation. They define user participation as the assignments, activities and behaviours that users and their representatives perform during the system development process. User involvement refers to the subjective psychological state reflecting the importance and personal relevance that a user attaches to a given system. User participation is defined as the degree to which the customer is involved in producing and delivering the service. System designers have promoted techniques requiring user participation, such as prototyping, rapid application development and joint application design.

A user is a person using services on a day-to-day basis within the business. This means that IT staff need to be involved in the development and production of appropriate and relevant Service Level Requirements (SLRs) and Agreements (SLAs) that detail the business quality targets, together with required business functionality.

According to Cartledge [11], an Informed Customer (IC) is a term that came into use in the late 1990s. to describe a customer with some information system (IS) perspective. Typically the areas of involvement of ICs are:

- The alignment of business and IT plans and strategies.
- The development of Business Unit objectives and requirements for IS.
- The establishment and co-ordination of user groups.
- The development, negotiation and agreement of SLRs and SLAs.
- Managing the provision of the IS services on behalf of their Business Unit.
- Shared risk and reward, e.g., agreeing how investment costs and resultant efficiency benefits are shared.

For example, in PRINCE2 project management methodology [6], [16], the Senior User represents the interests of the users, who will use the final products of the project, those for whom the product will achieve an objective, or those who will use the product to deliver benefits.

A. User Experience

The concept of user experience is understood as the subjective relationship between user and application. It goes beyond the usability of the application, focusing on the personal outcome that the user gets from interacting with the application while performing a task [10]. In Human

Computer Interaction (HCI), the term of experience design is about considering the user, the task and the context when designing a computer application [9]. Usually, the projects have a large context that the users should understand and IT people should integrate into their planning. This context is the project's ecosystem and it includes the environment they are working within the company culture, the general type of work they all will be engaged and the people with whom they interact within their roles and responsibilities. According to Beccari and Oliveira [5] the User Experience orientation points to project goals, but not just to attain effectiveness, efficiency and satisfaction, but it aims to enhance the entire experience resulting from the use of a product, system or service.

B. User Centered Development Process

The purpose of User Centered Development (UCD) is to develop products with a high degree of usability. The user becomes the centre of focus in the product development process. UCD is defined as a user interface design process that focuses on usability goals, user characteristics, environment, tasks and workflows in the design of an interface [20], [7]. According to Goncalves and Santos [14] the UCD is a philosophy that is based on the needs and interests of user and requires an investigation of user activities, profile, environment and goals. The key common concepts in UCD are as follows:

- Focus early on users and tasks to understand user cognitive, behavioural and attitudinal characteristics.
- First design the user interface.
- Involving the users in design and design reviews.
- Insisting on iterative prototyping and evaluation [17].

Design methods include prototyping and participatory design. Among the evaluation methods, there are usability inspection methods, and user testing methods such as laboratory and field tests. Participatory design concerns the direct participation of the beneficiaries of the introduction of a computer application. Major issues considered in this approach cover the expertise regarding users' own work, sustainable innovation opportunities, multiple viewpoints and taking differences seriously as facts and resources, the linking of the work practices, technology, and work environment context [26].

IV. EMPIRICAL RESEARCH ON USER INVOLVEMENT

The literature studies created the need to empirically verify that very optimistic attitude of academic publications' authors towards user involvement. Therefore, the empirical research was done in 2011. The research covered the interviews with Chief Information Officers (CIOs) from 270 firms in Poland. Characteristics of the surveyed firms are presented in Table II. User involvement in this paper is considered as participation in the business information system development process measured as a set of activities that users have performed. In this research, CIOs answered the questions concerning the activities of users at their

companies. Historically, there are several kinds of adaptive methods of information system development that build a model of users' knowledge and their involvement in that process. Active participation of a person in a community is a powerful indicator of the person's interests, preferences, beliefs and social and demographic context. Community members are a part of users' model and can contribute to tasks like personalized services, assistance and recommendations.

TABLE II. SURVEYED COMPANIES FEATURES

Feature	N=270
Number of employees	
Micro Enterprises (1-9 employees)	44,4%
Small Enterprises (10-49 employees)	29,3%
Medium Enterprises (50-250 employees)	15,2 %
Big Companies (more than 250 employees)	11,1 %
Dominating Activities	
Production	9,3%
Commerce	22,6%
Services	50,4%
Mixture of above activities	17,8%
Main Clients	
Individual	61,1%
Institutional	38,9%
Scope of Activities	
Local market	27,8%
Regional market	23,7%
National market	35,6%
International market	7,4%
Global market	5,6%

Involvement of the end users in IT projects covering IS development is presented in Table III. In Table III, the following activities of users have been specified: goal specification and project concepts (GSPC), business logic analysis and business process modelling (BLA BPM), requirements engineering (RE), information system design (ISD), information system implementation (ISI), information system testing (IST), information system installation and migration to a new IT environment (ISE), information system maintenance (ISM), security of information system (SIS), information system usage (ISU).

TABLE III. PARTICIPATION OF USERS IN IT PROJECTS

	User					
	Passive	Evaluator	Co-creator	Partner	Producer	Prosumer
GS PC	15%	17%	33%	24%	10%	1%
BLA BPM	32%	22%	19%	20%	5%	1%
RE	37%	19%	17%	16%	10%	1%
ISD	34%	20%	19%	15%	10%	1%
ISI	39%	16%	19%	15%	9%	1%
IST	18%	20%	24%	21%	15%	2%
ISE	22%	27%	24%	14%	10%	2%
ISM	20%	23%	24%	19%	12%	3%
SIS	33%	18%	20%	14%	13%	1%
ISU	7%	23%	20%	30%	15%	4%

In Table III, six different profiles of users has been included. Passive users and users-evaluators are oriented

towards the observation and acceptance of other people efforts. Co-creator supports IT staff in business information system development works. User as the partner plays equally important role as IT professional in the system development process. User as the producer is self-dependent and has got sufficient competencies to utilize IT independently of the IT staff help. The last, i.e., prosumers are able to utilize IT by themselves and for their work purposes. In this paper the definition of prosumption was adapted from the work of Xie et al. [28]. According to Xie et al., prosumption consists of individual and social acts by users in an exchange relationship that help to co-produce and gives rise to sociopsychological experiences for the buyers (i.e., users) in cooperation with the sellers (i.e., IT people) [28]. Taking into account the survey results, it should be noticed that only some percent of users were evaluated as prosumers. Generally, they are from SMEs sector and they are working on their Web portals and e-business system development. Prosumption implies that buyers produce products for their own consumption. Although most contribution in marketing today have been constructed with the view of consumers as passive buyers of what others produce, there is a perspective that it is rather limited approach and in e-business users have tools to produce Website for their own usage. Taking into account the results included in Table III you can notice that users are rather inactive. CIOs evaluate users as inactive at business analysis and business process modelling stages as well as at requirements engineering, system design and implementation. IT people do not demand the technical expertise from users, they should be helpful at the initial stages of business information system development process. Users were evaluated as co-creator in project concepts specification, information system testing and maintenance. Security of IS is the domain of IT professionals, and of course the strong activity of users is revealed at the business information system exploitation stage.

In the survey, CIOs were asked about the attitudes of the users towards changes of IT/IS. Eventually, CIOs admitted that users have got innovative ideas concerning information systems functionalities, but they do not solve the problems independently. Radical as well as evolutionary changes of information systems functionalities are implemented with involvement of user as well as IT professionals. Users are not able to find the solution, solve the problem and create the software product independently. They prefer the product developed and maintained by IT professionals or in cooperation with them. CIOs were asked about the user support in IT product promotion process (see Table IV). According to CIOs, users are not involved in the distribution of information about IT product. Mostly, they distribute information about the product usage (see Table IV).

CIOs provided opinions on users' involvement in the IT product promotion process. The process was divided into three stages:

- Stage 1 (S1), before entrance of the product to the market.
- Stage 2 (S2), when the IT product is on the market.
- Stage 3 (S3), when the IT product is removed from the market.

TABLE IV. IT PRODUCT DISTRIBUTION SUPPORT

User supports distribution of the IT product information		
<i>Support of IT product information on:</i>	<i>Yes</i>	<i>No</i>
IT product design	39%	61%
IT product installation methods	41%	59%
IT product maintenance methods	41%	59%
IT product usage	59%	41%
The implemented product in comparison with other similar products	50%	50%

As it is presented in Table V users are not interested in promotion of IT products on the market. CIOs explain that the IT products are for business usage, and not for the meeting of the private needs, therefore the users are not involved and they do not identify themselves with the enterprise and its IT resources utilization strategies. CIOs admit that lead users are able to define the IT trends, but preferences of lead users and normal users are not the same. The normal users focus not only on new functionalities of IT products, but also take into account non-functional requirements, i.e., cost, processing time, scalability, interoperability, compatibility, reliability and security of IT products, and technical support.

TABLE V. USER INVOLVEMENT IN IT PRODUCT PROMOTION

	User involvement in IT product promotion				
	<i>Very frequently</i>	<i>Frequently</i>	<i>Rarely</i>	<i>Very rarely</i>	<i>Never</i>
S1	11%	17%	24%	17%	30%
S2	18%	24%	21%	13%	23%
S3	4%	11%	18%	12%	55%

CIOs have noticed the development of user communities, but that process is still at the beginning stage and the final results will be available in a few years (see Table VI).

TABLE VI. USER COMMUNITY DEVELOPMENT

User Communities Development		
<i>Type of online community</i>	<i>Percent of reviewing companies</i>	
	<i>Yes</i>	<i>No</i>
Community created by the enterprise management	35%	65%
Community created by the enterprise users	31%	69%
Community created by the similar product proponents	22%	78%

The user involvement in the IT product development was evaluated through the questions concerning the user participation in IT research (see Table VII).

CIOs argue that users are involved in the IT research. They are less engaged in the basic research, but their efforts are highly appreciated in the developmental works, implementation and exploitation processes. For example, users are encouraged to take part in the Operational Programme Innovative Economy projects for SMEs, where

they have the opportunities to use the knowledge and expertise for new IT products implementation and exploitation.

TABLE VII. USER PARTICIPATION IN RESEARCH

User Participation in Research		
<i>Type of research work</i>	<i>Percent of reviewing companies</i>	
	<i>Yes</i>	<i>No</i>
Technology development research	25%	75%
Application development research	39%	61%
Developmental works	49%	51%
Pilot implementations	66%	34%
Commercial product exploitation and maintenance	69%	31%

V. DISCUSSION AND FURTHER RESEARCH

The approach concerning the user as an innovator has led to a new innovation paradigm, in which customers play a central and very active role. Rather than seeing users as the market, the new paradigms and IT product development methods focus on users involvement. According to Xie et al. the realization that users are actively involved in creating value and benefits for their own consumption is aligned with the post-modernist view that the user is a participant in the IT development process. The user involvement is important because of the necessity to develop end user computing (EUC) and reduce the risks of EUC [22]. The risks associated with the end user computing include: weak security, inefficient use of resources, inadequate training, inadequate support, incompatible and redundant systems, ineffective implementations, copyright violations, the destruction of information by computer viruses, unauthorized access or changes to data and programs, unauthorized remote access, reliance on inaccurate information [1].

In the aspect of end users, their involvement in the information system development process results from the opportunities to openly criticize insufficient ICTs solutions provided to the customers i.e., users. Users have got their own personal satisfaction and have possibilities to learn new products. They want to be followers of their competitors and business partners, if only the IT solutions implementations have provided financial benefits. Users can learn new products in the production process and through this "learning by doing" can reduce the cost of trainings. The interviewed CIOs share the opinions that in the co-development process, users benefit because:

- Their own ideas enrich the software products functionalities as well as non-functional characteristics of the products.
- Software firms encourage users to be involved in the production process and pay them.
- The software implementation costs are reduced.

Therefore, the further research of users attitudes seems to be important.

VI. CONCLUSION

Perhaps the research results are not very impressive in comparison with the literature reviews and other authors' studies, which include a more optimistic vision of end user involvement in IT implementation and exploitation processes. The references cover works where qualitative research and theoretical considerations are included. This statistical survey presents that users are not strongly involved and only spectacular cases describe an innovative approach of users. According to this research results, users are afraid of novelty and risks and they prefer to rely on IT people knowledge and preferences.

However, the research results reveal generally positive opinions about user participation in business information system development projects. Probably, there is a need to create the culture of end user involvement and participation in the social and business organizations to encourage users to IT development activities. Within an organization there are various groups of interests that have their own cultures. Across the entire company there is often a corporate culture that is the collected set of values, traditions or other elements that characterize the company. Therefore, the cultures should develop generally positive attitudes towards users' innovativeness.

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REFERENCES

- [1] S.D. Allen-Senft and F. Gallegos, "Managing Risks in User Computing," in *IS Management Handbook*, 8th Edition, C.V. Brown, H.Topi, Eds. Auerbach Publications, London, 2003, pp. 771-780
- [2] Ch. Anderson, *The longer Long Tail, How Endless Choice is Creating Unlimited Demand*. Business Books, London, 2009.
- [3] C. Baldwin, Ch. Hienerth and E. von Hippel, "How user innovations become commercial products: a theoretical investigation and case study," *Research Policy*, 35(9), 2006, pp.1291-1313.
- [4] H. Barki and J. Hartwick, "Rethinking the concept of user involvement, and user attitude," *MIS Quarterly*, 18(1), 1994, pp. 59-79.
- [5] M.N. Beccari and T.L. Oliveira, "A Philosophical Approach about User Experience Methodology," in *Design, User Experience and Usability, Theory, Methods, Tools and Practice*, A.Marcus, Ed. Springer, Heidelberg, 2011, pp. 13-22.
- [6] C. Bentley, *PRINCE2, A Practical Handbook*. Butterworth-Heinemann, Amsterdam, 2010.
- [7] H. Beyer, *User-Centered Agile Methods*. Morgan & Claypool Publishers, Boston, 2010.
- [8] G. Bhalla, *Collaboration and Co-creation, New Platforms for Marketing and Innovation*. Springer, Berlin, 2011.
- [9] B. Buxton, *Sketching User Experiences*. Morgan Kaufmann, San Francisco, CA, 2007.

- [10] E.H. Calvillo-Gamez, P. Cairns and A.L. Cox, "Assessing the Core Elements of the Gaming Experience, " in *Evaluating User Experience in Games, Concepts and Methods*, R. Bernhaupt, Ed. Springer, London, 2010, pp. 47-72.
- [11] A. Carlidge, *Best Practice for Business Perspective: The IS View on Delivering Services to the Business, ITIL, the key to Managing IT services*. TSO, Norwich, 2004.
- [12] C. Claycomb, C.A. Lengnick-Hall and L.W. Inks "The customer as a productive resource: A pilot study and strategic implications," *Journal of Business Strategies*, 18(1), 2001, pp. 47-69.
- [13] *Giving Knowledge for Free, The emergence of open education resources*, Centre for educational reserach and innovation, Organisation for economic co-operation and development, OECD, Paris, 2007. http://www.oecd.org/document/41/0,3343,en_2649_35845581_38659497_1_1_1_1,00.html, retrieved: May 2011.
- [14] J. Goncalves and C. Santos, "POLVO- Software for Prototyping of Low-Fidelity Interfaces in Agile Development," in *Human-Computer Interaction, Design and Development Approaches*, J.A.Jacko, Ed. Springer-Verlag Berlin, Heildeberg, 2011, pp. 63-71.
- [15] J. Matthing, B. Sandem and B. Edvardsson, "New service development: learning from and with customers," *International Journal of Service Industry Management*, 15(5), 2004, pp. 479-498.
- [16] M. Pieper and J. van Bon, *Project Management Based on PRINCE2*. Van Haren Publishing, Zaltbommel, 2005
- [17] H. Pradeep, *User-Centered Information Design for Improved Software Usability*. Artech House, Inc. London, 2004.
- [18] C.K. Prahalad and V. Ramaswamy, "Co-opting customer competence", *Harvard Business Review*, 78(1), 2000, pp. 79-87.
- [19] J.B. Quinn "Managing Innovation: Controlled Chaos," *Harvard Business Review*, May-June 1995, pp. 73-84.
- [20] C. Righi and J.James, *User-Centered Design Stories*. Elsevier, Amsterdam, 2007.
- [21] E.B. Roberts and A.L. Frohman "Strategies for Improving Research Utilization," *Technology Review*, March-April, 1997, pp. 33-36.
- [22] S. Senft and F. Gallegos, *Information Technology Control and Audit*, CRC Press, Taylor and Francis Group, London, 2009
- [23] D. Tapscott and A.D. Williams, *Wikinomics: How Mass Collaboration Changes Everything*. Penguin, New York 2007.
- [24] J. Tidd, J. Bessant and K.Pavitt, *Managing innovation, Integrating technological, market and organizational change*, 3rd Edition. J.Wiley & Sons, Chichester, 2005.
- [25] J. Tidd and J. Bessant, *Managing innovation, integrating technological, market and organizational change*. J.Wiley and Sons, Ltd, Chichester, 2009.
- [26] B. Torpel, A.Voss, M. Hartswood and R. Procter, "Participatory Design: Issues and Approaches in Dynamic Constallations of Use, Design and Research," in *Configuring User-Designer Relations*, A. Voss, M. Hartswood, R. Procter, M. Rouncefield, R.S. Slack, M. Buscher, Eds. Springer Verlag London, 2009, pp. 13-30.
- [27] S.M. Williford "Reviewing User-Developed Applications," in *IS Management Handbook*, 8th Edition, C.V.Brown and H. Topi, Eds. Auerbach Publications, London, 2003, pp. 781-798.
- [28] Ch. Xie, R.P. Bagozzi and S.V. Troye, "Trying to prosume: toward a theory of consumers as co-creators of value," *Journal of the Acad.Mark.Sci* (2008) 36, 2008, pp. 109-122.