THE FLOW EXPERIENCE OF ONLINE SEARCH: A LITERATURE REVIEW AND FUTURE RESEARCH AGENDA

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Abstract

The present study[1] reviews the interdisciplinary literature on online flow and analyzes the theory and the underpinning factors – with a special accent on the construct of interactivity. The focus of our review is the impact of rapid technological evolutions on the conceptualization and operationalization of interactivity.

The main objectives of our study are: first, to provide a systematic review of online flow; second, to identify and further investigate important constructs that are specific to the context of online search; and finally, to provide directions for future research in this area.

In order to support our exploratory theoretical research we have conducted a systematic electronic search using ProQuest, Social Science Citation Index, EBSCO, ScienceDirect and other bibliographic sources, such as unpublished doctoral theses. In addition to the search for referred journal articles, we included five IS-related conference proceedings (ICIS, ACIS, WWW 2007, MMM, INFORMS) in our literature search and analysis.

The paper is organized in three sections. The first section presents literature analysis results in the area of online flow and outlines limitations of existing studies in this area. The second section extends the initial research approach with a literature analysis in the area of interactivity studies in order to support flow model development in the context of Web 2.0. search. The third section suggests future research directions for a further improvement of flow models and a superior understanding of interactive online search experiences.

Keywords: *online experience, flow, interactivity, exploratory search, conceptual and structural models*

1. ANALYSIS RESULTS OF ONLINE FLOW LITERATURE

Research on online flow appears in a variety of journals and conference proceedings in the field of Information Systems, Marketing, Communication Studies and Psychology. These studies of online flow (Hoffman and Novak, 1996; Novak et al., 2000; Chen, 1999; Chen et al., 2000; Novak, Hoffman and Duhachek, 2003; Skadberg and Kimmel, 2004; Moore and Chipp, 2005; Finneran and Zhang, 2002; 2005; etc.) focuses on some aspects of experience that go beyond the action of simply accomplishing tasks using interactive Web systems and attempts to conceptualize and operationalize satisfaction in technology consumption.

The flow construct was first introduced in social sciences by Csikszentmihalyi (1975:52) as "optimal experience", which is characterized by the following elements: an equilibrium between the challenges of an activity and the necessary abilities to face these challenges; clear objectives and immediate feedback; concentrating on the on-going task; a feeling of control; a merger between action and awareness; a loss of self-conscience and autotelic[2] experience. Csikszentmihalyi comments upon all these factors that contribute to the flow state. He intends to identify the most frequently encountered factors rather than making an exhaustive enumeration.

Csikszentmihalyi's observations (1990) underline that the flow experience appears in two situations: while spending time passively or relaxing and in difficult, risky and tiresome activities that presuppose the existence of special abilities, concentrating one's attention and a certain level of perseverance. The flow state may occur both during physical activities and during the interaction with symbolic systems (mathematical or IT).

Hoffman and Novak (1996:57) apply the flow construct to marketing and adapt it to the online context with a redefinition of the flow experience as "the state occurring during network navigation which is: 1) characterized by a seamless sequence of responses facilitated by machine interactivity, 2) intrinsically enjoyable, 3) accompanied by a loss of self-consciousness, and 4) self-reinforcing". They have initiated an innovative theoretical perspective which links

the creation of special experiences in the online environment to facilitating *a flow state* (Novak et al., 2000; Chen, 2000; 2004; Chen et al., 2000; Skadberg and Kimmel, 2004; Novak, Hoffman and Duhachek, 2003; Moore and Chipp, 2005; Finneran and Zhang, 2002; 2005). Many other researchers in the fields of communication and computer sciences who are interested in the same subject (for example, Ghani and Deshpande, 1994; Ghani et al., 1991; Trevino and Webster, 1992) have also revealed the utility of the flow construct using it in more general interactions between human beings and computers.

The Web offers a specific course of action to experiment the flow because: there is always a need for aims (Web applications need permanent input to develop), it offers rapid feedback, it requires attention focus and implication, as well as acquiring and practicing special skills (other than the skills which are necessary in the offline world) (Chen, 2006). In a single effortless movement n the cyber space, Web users can enter a state in which their mind and action start to merge, and the physical surroundings start to fade. During these episodes, time stops its flow in order to correlate with the rhythm of experience while users tend to forget their own mental state and everyday problems and become one with the keyboard and the screen, with the words they type and the images they see. (Chen et al 2000:270-271).

1.1. Underlying Factors in Flow Models

As we have already mentioned, Hoffman and Novak (1996) are the first to apply the flow construct to an explanation of the search experience in hypermedia computer-mediated environments. They develop a conceptual model of the network navigation process which offers various extensions from the system (in case skills are higher than challenges, or vice versa), as well as opportunities to continue navigation (by maintaining a balance between skills and challenges), due to the fact that flow is the essential element in preserving the consumer in the hypermedia contexts. Developing on Csikszentmihalyi's theory (1975; 1990), they consider that *challenge, skill, ability and focused attention* are the main antecedents of the flow. Taking into consideration media communication literature, Hoffman and Novak add two secondary antecedents: *interactivity and telepresence.*

Hoffman and Novak's conceptual model (1996) has been improved and tested empirically in following studies (Novak et al., 1998; 2000). Novak et al. (2000) have conceptualized the online flow as a cognitive state experienced during the navigation process which is determined by (a) high levels of skills and control, (b) high levels of challenge and stimulation, and (c) focused attention enhanced by interactivity and telepresence.

One of the main changes brought to the original Hoffman and Novak's model (1996) is that the new model (Novak et al., 2000) considers the construct of *control* as being an antecedent instead of a consequence. Moreover, the construct of *stimulation* is an antecedent of the flow and it represents a dependent variable of *challenge.* The results of empirical research confirm the anticipated indirect influence of focused attention on the flow, by telepresence and time distortion. The reviewed model shows the direct influence of the construct of *importance* on focused attention and also on the level of skills and challenges. Although the interactive speed influences challenges, it does not influence telepresence.

Despite the complexity of their model, the extensive sampling used (over 2000 users) and some highly sophisticated statistical analysis techniques, Hoffman and Novak's has been criticized (see Chen et al.) for not being able to operationalize key concepts, such as *flow, skill and* in terms of specific Web activities (such as information search, downloading and uploading audio and video clips, chatting, online games, etc).

Novak et al. (2003) have confirmed their previous works by identifying two types of flow: the *experiential flow* (associated with the recreational use of the Web), and the *goal-oriented flow* (associated with research activities or online shopping). They (Novak et al. 2000) have established that *telepresence/time distortion, exploratory behaviour, focused attention and challenge/*

stimulation are correlated with a recreational use of the Web, whereas *skills/ control, importance/ autotelic experience* are correlated with goal-oriented activities. Furthermore, less experienced users who were part of the survey tend to regard the Web in a rather playful and hedonic way, while more experienced users consider it a means of task achievement.

Novak et al. (2003) operate a series of quantitative analyses based on qualitative descriptions of some flow experiences provided by Web users and collected in correlation with the 10th *GVU WWW User Survey* (December, 1998). Unlike their predecessors, who suggested that the probability of a flow state is more likely during recreational activities, Novak et al. (2003) have gathered mainly flow testimonies related to goal-oriented activities, although on the whole, the empirical data support the theoretical association of both type of activities with the flow state.

Chen et al. (2000) suggest that key concepts – *flow, skill and challenge* – should be operationalized in terms of specific Web activities. Based on an open research instrument, they invite subjects to answer in their own terms to questions related to those occasions and activities when they felt a flow experience. Thus, the authors have adapted the *Flow Survey* (Delle Fave and Massimini, 1988) in a format that offers respondents various passages that describe the flow state and asks them: (a) if they had such an experience; (b) how often and (c) in what activity context. The quotations used in the survey were taken from Csikszentmihalyi's original interviews (1975). The survey results show that the online activity most often associated with the flow is extracting information (60.6%), followed by reading/ newsgroup debates (10%), reading/ answering e-mails (9%), Web page creation (6%), online game play (10%) and chatting (4%).

Unlike the Hoffman and Novak's one-dimensional measures (1996) (also found in Novak et al. - 2000, Chen et al. - 2000), which summarize measures such as *control*, *concentration and pleasure* in one concept, multi-dimensional approaches of the flow assess each component of the concepts and use structural models to test if these components define an important factor of the flow.

Koufaris (2002) measures a set of five key concepts related to the flow state: *control*, *enjoyment, concentration, perceived usefulness and perceived ease of use*. He uses the flow theory to investigate how emotional and cognitive responses to online shopping affect online consumer behavior, especially their intention to return to an online shop and the probability to make spontaneous purchases. He acknowledges the relevance of the constructs of *intrinsic enjoyment, perceived control* and *concentration/ focused attention* to capture emotional and cognitive aspects of consumer experience, even if he does not use directly pre-existent flow models.

Koufaris's model relates constructs from the flow theory with elements from the Technology Acceptance Model (Davis, 1989), such as *ease of use* and *perceived usefulness*, as well as other determinant factors for emotional and cognitive responses, for instance *product involvement* and *search mechanisms with added value*.

The data collected by Koufaris have confirmed the positive relationship between the intention to return and the shopping enjoyment or perceived usefulness, among other things, but have negated a positive relationship with the perceived control, concentration and perceived ease of use. Furthermore, the author has suggested that users of flow theory should be cautious when applying it to online consumer behavior, due to the fact that only the hypotheses related to *pleasure* have been validated out of all the flow components.

Conceptual and qualitative research is also useful in defining concept components which can be tested as relevant factors of the flow. A relevant example is Pace's model (2003) which is based more on constructing flow theory rather than testing it. In complex semi-structured interviews, his respondents were asked to comment on their experiences when using the Internet for information search; then categories of data have been identified and coded; finally, the relationships among these categories have been identified. The conceptual model that

resulted corresponds to the model proposed by Hoffman and Novak (1996).

Pace (2003) considers the flow state as a multi-dimensional concept formed of *joy of discovery, reduced awareness of physical surroundings, distorted sense of time*, *merging of action and awareness, sense of control, mental alertness and telepresence.* Some of these concepts are considered by Hoffman and Novak (1996) as antecedents of the flow state (that is, control, telepresence, and time distortion), whereas others are considered to be consequences (that is, joy of discovery). Yet, Pace's qualitative methodology cannot respond to the causality relationship problem within the multi-dimensional set of concepts identified as flow components.

Another series of studies on the online flow support the importance of Web page design elements as antecedents of the flow state. Huang (2003) uses a multi-dimensional structural model that includes four different concepts for the flow experience – *control*, *attention*, *curiosity and interest.* As antecedents of the flow, he proposes and tests the *complexity* (represented by information load), the *interactivity* (here, the level of information exchange) and the *novelty* (or the new, unfamiliar, surprising events) of a Website. The validation of hypotheses has revealed the fact that users' attention is distracted by the complexity of the site site-ului, which endangers the flow state. Moreover, the author aims at underlining the difference between the impact of the flow on utilitarian performance, and on the experiential performances of the site. The results of the research show that attention influences utilitarian aspects, while control and interest influence hedonic aspects. Curiosity has a balanced impact on both dimensions.

Skadberg and Kimmel (2004) present a flow model that predicts the level of the flow generated by the interaction with a touristic site (a site about the birds in a specific region which should attract tourists to visit that area). Visitors' domain knowledge represents the *skill,* whereas the content of the Website constitutes the *challenge* within this model. The third antecedent of the flow is *telepresence,* influenced by *attractiveness* and *interactivity* of the site, where interactivity is determined by *speed and ease of use*. The flow itself is measured by *time distortion* and *enjoyment*.

Guo and Poole (2009) follow Novak, Hoffman and Yung (2000), Skadberg and Kimmel (2004) and Huang (2003) and analyze the influence of Website characteristics on visitors' general flow state. In their research they choose *complexity* as a distinctive characteristic of a Website and they define it as a difficulty level perceived by the visitor in understanding, processing and interacting with the form and content of a Website.

Unlike their predecessors, Guo and Poole (2009) underline that, in their model, the effects of the *site complexity* on the flow state are mediated by pre-conditions of the flow state, that is, the *balance of skill and challenge, the clarity of goals and the feedback mechanism.* However, the results of their research have only confirmed the positive relationship between the *balance of skill and challenge,* and *the feedback mechanism* and the flow state. No effect of *the clarity of goals* on the flow has been demonstrated.

The research also validates the effect of the site complexity on the flow through strong negative correlations with all the three pre-conditions of the flow and has proved the superiority of indirect influence over direct influence. As possible research directions, the authors suggest including flow pre-conditions as mediating factors between the flow and technological characteristics, individual and task characteristics. The flow itself is also measured by Guo and Poole (2009) through the constructs of *concentration, perceived control, merging of action and awareness*, *time distortion, loss of self-consciousness, autotelic experience,* thus managing to come closer to the original flow model (Csikszentmihalyi, 1988) than their predecessors.

Another group of researchers includes individual differences (other than skills) among decisive factors that influence flow intensity. Finneran and Zhang (2002), for example, propose applying the Person-Artifact-Task (PAT) model to online flow experiences. Artifacts or instruments (in this case, applications) are new dimensions added to the model. The flow experience is lived differently not only

according to the person but also to the context, as far as the task and the instruments are concerned. Compared to other models, Finneran and Zhang's model raises the problem of congruence between the accomplished task and the instrument used.

Moore, Shaw and Chipp (2005) present the hypothesis that the flow exists at all levels of online behavior (that is perception, motivation and online consumer behaviour) and that it has a certain effect on their functioning. They consider that Hoffman and Novak's initial model (1996) is too static and does not take into consideration the dynamic nature of the flow, the interactions that it has both as a mediator factor and as a mediator element. In their opinion, flow intensity is influenced by what they call *behavioural controls*[3], such as: owning a state-of-the-art piece of technology (a personal computer, a mobile phone, a PDA, etc.) which is compatible with Internet use, availability of fast and safe Internet access (telephone lines, cable or satellite links, etc.) or the so-called *enabling resources*, including users' skills and characteristics.

1.2. Limitations of Existing Flow Models

After reviewing online flow literature we can point to the following observations: (1) a rather strong discrepancy in defining constructs and in forming the model structures; (2) frequent avoidance of distinct type of activities (such as the search) and type of applications; (3) the inability to adapt interactivity measurement instruments to Web 2.0 evolutions.

In the analysed studies, the constructs of skill and challenge receive various interpretations and have as a reference term either technological aspects (such as search skills) or content aspects (skills in a certain knowledge field). However, the most inconsistently applied construct in the flow models is *goal clarity* (Pace, 2003; Guo and Poole, 2009).

Thus, we consider that the online search activity, unlike all other Web activities, is mainly, a means in attaining a subjacent goal. The users are attempting to reach their goals with the help of identified information. Moreover, in some cases, the search may be used to attain several goals simultaneously: to inform, to find an object, to chat with all those interested in the same subject, etc. Flow theory and the optimal state of mind described by it undergo, during online activities, a change of focus from the goal clarity to clarifying goals with the help of informational systems and applications.

In addition, technological evolutions as far as online search applications are concerned, allow goals to adapt to interfaces. The moment when search engines are able to infer from the data introduced by the visitor the real goal of the search, they manage to offer personalized experiences and a high level of interaction.

Nowadays, Web 2.0 applications tend to develop towards this direction, as they try to become genuine interactive maps of users' cognitive and mental states during online navigation. Goal adaptability is one of the crucial factors in the development of new Web interfaces and applications for intelligent terminals, which are conceived to be used in different contexts and situations.

All these technological evolutions determine a continuous modification of the conceptualization and operationalization mode of the theoretical construct of interactivity. Among all the flow constructs, the interactivity construct remains the most problematic due to the fact that it is strongly connected to the surprising evolution of technology.

In order to refine flow models in the context of online search and to identify new causal relationships among constructs, we suggest that a parallel analysis between the constructs of *interactivity* and *goal clarity* should be conducted. In this respect, in the second part of the present study we extend the theoretical research to the area of interactivity research.

2. A THOROUGH INVESTIGATION OF THE INTERACTIVITY CONSTRUCT

From the very beginning of the research on online flow, the Web design factors have been considered essential for an optimal experience which should be fascinating as far as the

obtained results and enjoyment are concerned. Among the defining aspects of Web design, marketing researchers as well as researchers in the field of communication and IT mention the characteristic of *interactivity*.

For a thorough development of a multi-dimensional measure of interactivity in the context of hyper-interactive Web applications, we offer an exhaustive critical review of interdisciplinary literature on interactivity.

The first and the most common way of defining Web interactivity is that of feature of technology to facilitate multidirectional communication (Markus, 1990), of a specific functionality which allows users to control media form and content (Steuer, 1993). In marketing research, Blattberg and Deighton (1991) define interactivity as a facility that helps individuals and organizations to communicate directly, without limitations in time and space. Deighton (1996) defines it as the ability to address the individual and as a capacity to collect and memorize their answers.

From a technological point of view, interactivity represents the *interaction potential* contained by every media (Steuer, 1993, Rafaeli, 1988). Steuer (1993) operationalizes interactivity through three distinctive concepts: *speed, range and mapping capabilities. Speed of interaction* refers to the assimilation rate of the input in the medium – a variable with a maximum value given by real-time *interactivity* (a common value for broadband Internet today). *Range of interaction* refers to the number of action possibilities at each given moment and includes *temporal distribution, spatial organization*, *intensity* and other frequency characteristics. The greater the number of parameters that can be modified the larger the range of the interaction capacity. *Mapping* refers to the naturalness and intuitiveness of the system reactions to the actions initiated by users. In extreme cases, this mapping of interaction may be completely arbitrary and with no connection to the functions executed by users.

Another research direction, with a departure point in the active implication of users, approaches the idea of interchangeability of roles between sender and receiver. Rafaeli (1988), one of the most quoted authors who enter debates on interactivity, locates interactivity in the *symmetry* of *information exchange* among participants and not so much in the media or human perception characteristics. Rafaeli (1988) defines interactivity as "an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions" (Rafaeli 1988:111). Following the same conceptual tradition, Ha and James (1998:461) define interactivity as "the extent to which the communicator and the audience respond to, or are willing to facilitate each other's communications needs".

However, the decisive characteristic of the hypermedia interactivity which sets it apart from all offline forms of interactivity is not the relationship between sender and receiver but the communication rapports between user and the communication interface (Steuer, 1993; Hoffman and Novak, 1996). Human – computer interactivity takes place through the *interface*, a concept which comprises both the design part of the system (a hardware and software combination used by human to communicate with computers) and the cognitive and emotional aspects of the experienced lived by users (McMillan, 2000a,b).

Even when they focus on objective characteristics of the media, the authors mentioned above refuse to include interactivity used by humans independently from media technology. As Tremayne (2005), underlines, humans are, in fact, *interactivity agents.* Even Steuer's extensive definition (1993:14) emphasizes it: "interactivity represents the extent to which users can participate in modifying the form and content of a mediated environment in real-time". The direction for communication research from *an experiential* perspective analyses the phenomenon of interactivity through the prism *of* users' perception (Wu, 1999; 2000; 2005; McMillan, 2000a,b, 2005; McMillan and Hwang, 2002; Sohn and Lee, 2005; Lee et al., 2004).

The most frequently quoted empirical research that attempt to form and confirm some scales of *perceived interactivity* are McMillan and

Hwang's (2002) and Wu's (1999; 2000). McMillan and Hwang (2002) start their research on perceived interactivity with a critical review of literature where they identify three fundamental dimensions of interactivity: communication, control and time dimension. Liu (2003), Liu and Shrum (2002) support a similar conceptualization of the interactivity construct, based on three major dimensions: *active control, bi-directional communication* and *synchronicity*.

In order to preserve the precision in the conceptualization and operationalization of the interactivity construct, McMillan and Hwang (2002) subdivide the control dimension in *navigation control* and *choice of information control,* whereas the dimension *time* is subdivided in *necessary time for loading* and *necessary time for finding information*. Conceptual delimitations and overlapping, which are identified by McMillan and Hwang (2002), are conceptually exposed in their model. All the items included in the three scales are identified during a rigorous process that includes interviews and group focus. Due to the slight conceptual overlapping, special attention was given to the reformulation of items when elaborating the final scale.

In Wu's research (1999), *perceived interactivity* is a bi-dimensional construct which comprises the factors *navigation* and *responsiveness* of the system, which are operationalized in navigating on a commercial Website. The author considers that the *perceived interactivity and the attitude towards the site* are essential indicators for Website effectiveness and source for marketing information.

A distinctive research direction integrates objective and subjective approaches (Tremayne, 2005; Wu, 2005; Lee et al., 2005; Huang, 2003). Wu (2005) conceives such an integrative conceptual model where *perceived interactivity* is placed as a mediator factor between *effective interactivity* and users' *attitude* towards the site. Wu (2005) operationalizes the e*ffective interactivity* level through the variable presence of six interactive elements (such as e-mail hotlink, online chat-room or the ability to use a JavaScript). The level of *perceived interactivity* is measured with the help of a scale with three components: *hedonism* (fun to see, enjoyable, funny etc.), *the interest presented* (useful, helpful, important, etc.) and *utilitarianism* (boring, interesting, unusual). The empirical study confirms the mediator effect of perceived interactivity.

For Lee et al. (2004:64), the elements that define interactivity are grouped in five dimensions: *accessibility* (ease of accessing information), *navigability* (ease of finding information), *relationship* (facilitation of relationship building between users and a Web site as well as between users), *media richness* (multimedia capability), and *entertainment* (entertainment enhancing capability). Lee's empirical study (2004) evaluates and compares objective interactivity and perceived interactivity of three Websites belonging to well-known computer manufacturers (Apple, Compaq and Dell). They have used two distinctive research methods: content analysis and personal interviews.

All the studies mentioned so far in the experiential research of interactivity demonstrate that it depends on the users' needs for personal and contextual information, on their perception of the way the Web may help them find and use relevant information efficiently.

Objectively speaking, *interactivity* is a characteristic of technologies, and as far as the Web is concerned, it used to be characterized (before 2001) by a narrow-band infrastructure and speed and connectivity problems. Due to this fact, the majority of previous studies, even those from the beginning of the 21st century consider *interaction speed* a major variable of online experience. Broadband Internet and massive use of technology have put forward the fact that navigability (mapping) becomes the most important dimension of the interactivity between humans and online medium and the decisive factor in influencing search experiences.

3. FUTURE RESEARCH DIRECTIONS OF THE ONLINE SEARCH EXPERIENCE

Strong theoretical and conceptual frameworks can be developed through the integration of constructs from different research traditions and disciplines. Prior literature in computer,

communication and marketing research provides a rich foundation which is suitable to build a conceptual model for the study of online search experience. We recommend further research and an extension to the area of exploratory search and online interactive systems.

In the Web medium, consumers' information search strategies are doubled by support systems and intelligent interfaces, which function with the aim of reducing information overload and the feeling of loss (Hoffman and Novak, 1996). The navigation process faces the users with a continuous series of decisions that may be related to the main goal of the task or not. Furthermore, Web applications extend and amplify consumers' decisional processes due to their algorithmic structure and to access to *collective intelligence* (the many–to–many communication) that it allows.

Exploratory search is an emergent paradigm of information search (Liu et al., 2011) which targets the change of the centre of interest of research from *precision* of information search to *mapping* which can be accomplished in each stage of *the search process*. Due to intelligent interfaces, in the context of information search, goals tend to evaluate throughout the search task. *Exploratory search* helps people solve uncertainty during the information-seeking process. Not only do search goals become clearer but also the users become familiar to the complexity of the informational space (White et al., 2008). Humans who become engaged in an exploratory search aim at solving complex informational open-ended[4] problems in an unfamiliar and complex environment, where orientation is difficult to preserve.

Extending exploratory theoretical research to the studies related to exploratory search contributes to an improvement both in theoretical models of the flow by identifying new causal relationships among the constructs of the model, and in measurement instruments of *interactivity* and *goal-clarity* by identifying new dimensions of phenomena reflected by these constructs.

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Endnotes

1 Marketing M31, M30, M39.
2 Autotelic refers to something that contains its end, and has an inner end or justification. In Csikszentmihalyi's works *autotelic* refers to a certain type of activity, "a self-contained activity" which "is done not with the expectation of some future benefit, but simply because the doing itself is the reward" (Csikszentmihalyi 1990:67).
3 According to Moore, Shaw and Chipp (2005), they can be seen as barriers that may prevent the users from reaching and maintaining a flow state and, to a lesser extent, to enter the online world.
4 Exploratory search processes have an "opportunistic, iterative and multi-tactical character" (White et al., 2008:1).