A REVIEW OF THEORETICAL APPROACHES ON DIFFUSION ANALYSIS: DISCUSSING ISSUES INVOLVED IN THE ADOPTION OF ICT SERVICES IN A COMPLEX SOCIO-ECONOMIC CONTEXT

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ABSTRACT

The diffusion and adoption of telecommunications (ICT) services has been strategically given much importance within the national agendas and policy debates; however traditionally the process of diffusion and adoption has been largely considered as a deterministic, mechanistic and linear process; controlled either by the local authorities (policy makers and regulators) or by the telecom suppliers (service providers). The participation of users in the development of innovation and its subsequent adoption has not been given much attention beyond their marginal roles either as passive adopters or silent rejecters of the ‘exogenously’ diffused technological products. Furthermore, past literature on the diffusion analysis is found to be predominantly overwhelmed with the statistical analysis and mathematical modeling, generally designed to explain the adoption patterns in the focused units of adoption; however by and large, these theoretical approaches often miss the critically important element of the diffusion analysis which deals with the resulting impacts i.e. the intended and unintended social, educational, political and economic consequences of the adopted services upon the end-users or targeted user communities. Hence, this paper argues for the need of a renewed focus and attention by diffusion scholars, policy makers, regularity authorities and telecom suppliers to understand and address the key underlying issues involved in the diffusion analysis.

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INTRODUCTION

The rapid and smooth diffusion of telecommunications services has been remained on top of the political and economic agendas for most of the nations, particularly in case of the developed countries due to the perceived strategic importance of ICT services in their relative educational performance, economic development, political empowerment and social cohesion at local, regional and international levels. However, the effective diffusion and adoption of telecom services is commonly observed as not a simple, smooth and linear process in most of the situations; particularly in the case of underdeveloped and developing countries, in terms of the observed patterns of adoption and resulting impacts of the diffused services. This paper argues that the diffusion and adoption of ICT services in a complex socio-economic context is rather an interactive, intriguing, emergent, continual and adaptive process that demands much deeper focus and attention of policy makers, regulatory authorities and telecom suppliers, if they aim for the successful diffusion and an effective adoption of telecom services in terms of the resulting social, educational, political and economic impacts on the focused units of adoption. A socio-economically complex unit of adoption usually misses the presence of a stable, transparent and predictable environment. This study critically reviews some major academic discourses on this perspective and also highlights some key issues which are recommended to be included in the future discussions in order to create a comprehensive, reliable and valid account on diffusion analysis.

1 In the following text, the terms ‘ICT’ (Information and Communications Technologies) and ‘telecommunications’ (telecom) services would be interchangeably used as synonymous terms to refer both the traditional telecom networks and the internet based services currently used for the text/audio/video communications and the other information based services facilitated by the use of internet.
LITERATURE REVIEW

Diffusion and adoption of ICT services has been frequently discussed in the recently published literature over the past few years, which reflects an increasing realization among the academic scholars about the significance of this topic. Before going to an in-depth discussion for some selected literature, I would like to first provide a brief overview of the most recently published papers over the period of 2011-2014, when searched on databases under this title. From a wide range of published papers, the author selects around 50 papers to find a general pattern in terms of the specific issues discussed in these publications. For that purpose, we may classify them in some major categories. A significant number of papers have discussed the characteristics of different ICT markets (De Marez et al., 2011; Wang et al., 2011; Yang et al., 2014; Lee et al., 2011; Xenikos, 2011; Sahibuddin et al., 2011), or they have adopted different theoretical models and approaches to establish an analytical or conceptual framework for the diffusion study (Overby et al., 2012; Dahan, 2011; Alwahaishi and Snasel, 2013; Sarkani et al., 2013). A stream of literature has focused on studying the ICT implications within the academic premises; such as e-learning initiatives or ICT-supported learning management systems (Nazemi and Mirabi, 2012; Ivala, 2011; Morgado and Schmidt, 2012; Alshwaier et al., 2012; Gitsaki et al., 2013). Some authors have focused on the socio-economic impacts of ICT services, and the arguable roles of policy and regulatory institutions in this aspect (Sethi and Tafti, 2013; Toh and Sandre, 2013; Kirs and Kallol, 2012; Yates et al., 2013; Abrahams, 2011). A number of papers have particularly focused on the end-users’ behavior and the observed community responses to the adopted ICT services (Merritt, 2013; Chen and Santhanam, 2011; Heart and Efrat, 2013; Kumari, 2012; Salman and Mohd, 2011; Williams and Patrick, 2013). Some authors have discussed the ICT adoption by the private firms and the resulting economic gains and impacts (Chen et al., 2011; Colombo et al., 2013; Demene and Anthony, 2012; Arduini et al., 2012; Gikenye, 2012). Finally, a significant number of papers have discussed the e-government initiatives to assess the e-readiness of the government and other public sector institutions (Mbathe et al., 2011; Fattah et al., 2014; Shareef et al., 2011; Brown and Sheryl, 2011; Kamal et al., 2011; Reggi et al., 2014; Weerakkody et al., 2011; Alghamdi et al., 2013; Beltrame & Dagostino, 2014). In the following section, I would focus on some of the selected literature published over the period of 1986-2010 for the detailed discourse analysis.

Dearing and Meyer (2006, pp.30-31) largely follow the Rogers’ (2003) school of thought on the diffusion research. However, they depart from the traditional approach on diffusion research saying that “the traditional approach to explaining diffusion often positions the adopters in a ‘reactive’ mode as socially-connected receivers and evaluators of new ideas and objects, but the new theories about diffusion suggest that adopters do more than being an active or reactive adopters, depending on the innovation in question, in influencing others or being influenced by them.” They further argue that “the potential adopters can also be full ‘partners’ in the creative process of innovating as a result of actively framing the ‘meaning’ of innovations, trading ideas back and forth both as innovation sources and innovation receivers, and by exploiting opportunities and constraints in the information and social environment.” It has been called essentially “a broad multidisciplinary issue of adopter activity; however the current formulations of adopter activity are mostly relegated to social interactions and not interaction with an innovation”. Hence Dearing and Meyer (2006, pp.30-31) depart from the traditional approach to diffusion research by focusing on adopters as creators of innovations (advocating for user-oriented, user-participated and user-driven innovations), a view of ‘democratizing diffusion for the public benefit’. Moreover, they explain that “the traditional view on the diffusion of innovations decouples the process of innovation from the process of diffusion”. On the other hand the theoretical perspective they propose “closely weds the two together for the purpose of detailing a means of ‘making a difference’ in social conditions” (i.e. by focusing on the resulting impacts and change on the society in result of adopting an innovation).

Dearing and Meyer (2006) further comment that “the particular context in which we assess adoption activity is a problematic and multidisciplinary domain of translational research.” They define the translational research as “the study of how evidence-based practices, programs, and campaigns can best be communicated for adaptation by program staff and intermediaries for the benefit of their constituents.” They further argue that the traditional approach show deficiency in certain respects in addressing this issue”. Hence, they (p.31) advocate that there is a “need for a ‘hybrid orientation’ to the intervention-based study of the diffusion of innovations while acknowledging and emphasizing on: the enduring role of centralized change agencies seeking for social betterment;
variance among the program staff not just as adopters but as innovators; and ‘innovation specificity’ as critical concern of program developers and change agencies in pursuit of external validity and diffusion.”

Srinivas (2006, p.151) takes a similar stand on the issue, concluding that “diffusion of innovation theory emphasizes the ability of media messages and opinion leaders to create knowledge of new practices, and persuade the target audiences to adopt the ‘exogenously introduced’ innovations. The notion of exogenously induced social change was implicit in diffusion practice and research.” Quoting to Rogers (2003) work on diffusion, Srinivas (2006, pp.151-152) elaborates that “the earliest definition of development was a type of social change in which new ideas are introduced into a social system in order to produce higher per capita incomes and better standard of living through adopting modern production methods and improved social organization. Modernization or the development of an individual and society was perceived as the process by which individuals and other units of adoption change from a traditional way of life to a more complex, technologically advanced, and rapidly changing life style. The necessary route for this change from a traditional to a modern man was understood as the communication and acceptance of new ideas from sources external to the social system. In this context, communication was visualized as the central link through which exogenous ideas entered the local communities”. Srinivas (2006, p.152) also critiques here on the inherent deficiency of the traditional approach on diffusion, saying that “over the time the diffusion theory is proved to be inadequate as a guide for communications planning in development campaigns.” Srinivas (2006, pp.166-167) rightly assesses that “empowerment through participation, grassroots organizing, and/or dialogic action may take a long time to mature and achieve significant results; and hence achieving empowerment cannot be presumed an easy task. It requires dealing with enclaves of power and influence that are deeply anchored both in the local and global power structure. It also involves an active participation of individuals and communities in intervention efforts affecting their welfare. However, it is the right thing to do if we are fully interested in appropriate and sustainable change.”

Katz (2008) also follows the above line of argument in his debate in terms of the social and cultural implications of an extensive mobile usage on the society as a whole, and particularly on the user communities. Ling (2008) examines the effects of instant and perpetual access to mobile communications on the social bonding. Based on the empirical data accumulated from extensive interviews and observations, he concludes that “mobile communication helps to engender and develop social cohesion within the family and peer group of friends, as like glue to the society that binds them together”. He further argues that mobile communications strengthen the social ties within the social circle; however, sometimes at the expense of interactions with those who are physically present in the immediate vicinity. Thus it often results in an obvious dissociation and detachment of the ICT users with their surrounding physical space, due to being obsessed or connected with the virtual world of communications through their ICT gadgets. In such situations, it becomes also vivid that the human to machine interactions often dominate and supersede the human to human interactions.

Castells et al. (2007) debate the diffusion of mobile and wireless technologies across the world in terms of their social consequences, while differentiating the user communities with respect to their demographic, socioeconomic, gender, and ethnic distribution in a society. They raise some interesting questions to comprehend the diffusion research that essentially include the relevant impacts of adopted ICT services. Some of the interesting questions posed by Castells et al. (2007, pp.1-3) are: “how the friends’ and family life, professional communication and academic interactions have been affected by the ability of the individuals to pursue fairly independent activities through using ICT devices and services in their own premises; and yet to be constantly in touch and maintaining relations with their respective family members and friends, as well as remaining attentive to their professional circles and academic connections without jeopardizing the strength of their social and professional ties? How do the individuals maintain their privacy in the presence of ever expanding professional interactions without time and space limitations; and getting benefit from the changing patterns of learning and education in the new interactive scenario”? The question has been raised about the new emerging ‘youth culture’ that comes with its own language and specific expressions. It has been investigated that “what are the new ‘inequalities’ (digital divide’) introduced by the differential access to the ICT infrastructure and available services? Why do the users of the technology often end-up using the adopted technology for the purposes very different from those initially sought or conceived by the designers or the promoters of technology”? It has been argued that “people, institutions, and businesses have suffered enough from the prophecies of futurists and visionaries who promise and project whatever comes into their minds based on anecdotal observations and ill-understood developments”. It is further argued that consciously responding to these serious questions would affect our lives; but often it has been observed that the suppliers, policy
makers and adopters make decisions without profoundly having thought about the resulting impacts and the consequences of their decisions.

Castells and Cardoso (2006) discuss the ongoing transition of global societies towards becoming a full-fledged ‘network societies’ and ‘knowledge economies’ due to an increased access and connectivity with the information sources and the prevailing use of ICT services in the society; and hence, they also study the resulting changes and implications on the policy domain. Policy has been called a strategic choice in order to deal either with uncertainty in the future context or with a reality that is already faced by the population. It has been further argued that policy making is increasingly becoming important and at the same time a challenging task due to facing difficulty in correctly interpreting and understanding the ongoing changes to effectively address them by adapting with those changes accordingly. Skouby, et al. (1995, P.8) also discuss the social and economic implications of telecommunications and insist on the coordination between the key policy making institutions.

Rosenberg (1994) in his insightful discussion explains about the generation of technological change in reference to the processes by which the improved technologies are induced into economic activities. He argues that the technological change is a far more complex process than it is often thought to be, largely because much of the reasoning and modeling of technological change hopelessly oversimplifies its component parts. The central idea is that the technological changes are mostly ‘path dependent’ in the sense that the future technological trajectories and forecasting depends on the historical events and the past patterns of development; hence he argues that the historical context matters a lot in managing technological developments, not only from the supplier’s strategic perspective but more importantly from the policy-making and regulatory perspective. Being specific to the telecom industry, Rosenberg (1994) explains that the sector is currently experiencing a rapid and far-reaching technological change. Hence, he insists that a proper understanding of the forces that essentially shape the rate and direction of this change is mandatory for the policy-making and regulatory authorities in order to correctly predict and manage the upcoming technological changes and their wide ranging impacts. He further argues that even if it was possible to make authoritative predictions about the future path of technological change, which is not the case, the question about correctly assessing the ultimate social and economic impacts of those changes would have been entirely another matter.

From the policy perspective, Rosenberg (1994) further argues that an understanding of the broad properties of technological change in telecommunications serve as a useful tool to reassess the rationale of adapted policies and the cooperative alignment with the private firms. It is debated that the telecom policies are often heavily focused towards weighing the tradeoffs between currently available technologies under alternative regimes. It is said that unusually complex analysis is necessary merely to predict a possible range of the outcomes that might emerge in result of a policy decision. The policy should be constructed to ensure that the technological path is as flexible as possible, that resources are channeled towards those institutions which consistently provide larger ‘social benefits’. On the regulatory side, he adds on that the regulator should not pretend to be able to exactly predict the future level of ‘systemness’ or the viability of a specific technology. Hence in a complex and continuously changing telecom industry, the regulator should not be over confident in its sole ability to manage the technological change.

The approaches of ‘Social Construction of Technology’/SCOT (Bijker, et al., 1987) and the ‘Social Shaping of Technology’/SST (Bijker and Law, 1992) emphasize on the interdisciplinary nature of technology development (construction of artifacts) and its subsequent implementation (the diffusion and use within society), which are assumed to be shaped by a ‘seamless web’ of relations and interactions between multiple actors from the social, political, economic and technological domains. These approaches do not accept the given technologies (or technological systems) as taken for granted; just like the social, political and economic systems and their respective implications are not being accepted without due debates and arguments about their rationale. It has been debated that the lack of curiosity on behalf of society or the ‘users of technology’ may result in severe social and economic losses which become obvious later at a stage when faced with an unexpected technological outcome in terms of either an unintended or misuse of technology or in result of a catastrophic technological failure.

These approaches reject the element of ‘technological determinism’ (commonly known as ‘technology-push approach’) and decline any scientific attempt of being rigid, categorized or linear when looking for the scientific and technological solutions. Hence, these approaches highlight the fact that ‘we get the technologies we deserve’, since the technological outcome reflects the scale of societal (or the user) participation in the shaping and construction of technology. So, the current shape and status of our technologies and societies actually mirror both the technological and social realities of the consuming societies, since the societies are not only shaping the
technologies but they are themselves simultaneously being shaped by the adopted patterns of diffused technologies. This is considered to be especially true when the technological systems are indigenously developed, and not just being ‘imported’ as exogenous technologies without having considered the local context of their subsequent usage and implementation. In reality, these technologies are continuously being reproduced and shaped by the complex interplay of social, economic, political and technological factors. The final shape of technology appears to be a ‘closure’ which is achieved in result of a complex set of compromises and trade-offs between the involved actors after an ongoing negotiation and consensus-building process. The theories explain that the enthusiastic problem solvers, dedicated system builders, visionary entrepreneurs and innovators show no respect to the disciplinary knowledge boundaries. So, instead of following a specific disciplinary guideline, they rather explore the whole range of clues and possibilities wherever the problem-solving thread might lead them.

The Actor-Network Theory (ANT) has been evolved from the work of Callon (1986) and Latour (1987). An actor-network has been called essentially composed of both the human and non-human actors (such as a text, policy document, regulation or a technological artifact); and also the links that connect them together. ANT focuses on the translation processes and the interest alignment schemes, which these heterogeneous competing networks deploy in order to achieve their specific social, political and economic interests through promoting their own programs and agendas for the technological and social development. Hence, ANT simultaneously looks both at the social and technological elements the way they shape each other by engaging both the human and non-human actors within their envisioned actor-networks. ANT is also sometimes called as ‘Sociology of Translation’. In ANT ‘Inscription’ is known as the process of creating technical artifacts (e.g. devices, networks etc.) and texts (e.g. laws, regulations etc.) as non-human allies to ensure and protect the leading actor’s specific interest. The leading actors who control the ‘Obligatory Passage Points’ (OPP) are called as ‘focal actors’ since they have the control of those ‘gates’ through which every other actor or ‘mediator’ (a supporting actor) has to pass through in order to achieve their respective interests and objectives.

The ‘translation’ process is composed of four stages or called the ‘moments of translations’. In the first stage, the ‘innovator’ or the focal actor attempts to create a forum, a communication channel (or a social network) in which all the actors agree that the network is worth building and defending. In this first moment of translation known as the ‘problematization’ phase, the focal actor highlights a problem and defines it in a way to make him/her indispensable in the new formation. He/she formulates and articulates the problem in such a way to ensure that his/her specific interests and objectives are well protected by the adopted framework. In the second moment of translation called ‘Interssement’, the focal actor strategizes or formulates a strategy in an attempt to bring the others’ interests in line with its own interest to further consolidate and reinforce the strength of the ties (the connected links) of the emerging actor-network. In the third moment of translation, those whose interests are found in line (aligned) are then finally enrolled into the envisioned network and are assigned specific roles and positions by the focal actor accordingly; and on the other hand the others whose interests couldn’t be brought in line are eventually discarded out of the network by dissociating or weakening their connections and links with the newly enrolled elements (actors) of the emerging actor-network. In the final stage of translation, the enrolled allies and resources are effectively ‘mobilized’ through an efficient deployment of those resources and an optimal use of the allied forces (the network elements) in order to realize the goals and objectives initially set for the formation of this particular actor-network. Hence, with the passage of time the turbulence settles down and the new actor-network gradually gets stabilize. But this is only the beginning of the story, since there are counter translations being advanced or promoted at the same time by the competing networks; and hence those actor-networks whose ‘power of translation’ supersedes eventually control the market, and thus they render themselves as indispensable facts and the dominant ‘standards’.

Different ANT theorists have frequently referred to the above discussed translational approach in context of the diffusion and adoption of different technological innovations, including the telecommunications standardization process and ICT services: such as Akrich, et al. (2002a; 2002b); Gao (2007); Lyttinen and Damsgaard (1997); Gao and Damsgaard (2007); Akrich, et al. (2002a; 2002b). These authors have debated the key issues associated with the successful diffusion of technological innovations and the challenges faced in their adoption patterns within the local context. They criticize the naïve approach of the ‘technology-obsessed’ engineers, when they ignore the critical importance of the contextual understanding of the technological diffusion and adoption cases, and accordingly the significance of the relevant ‘translations’ that take place during the diffusion processes. They criticize those engineers for being overwhelmingly obsessed with the technical details and ignoring the important social, political,
economic and other contextual dimensions, which have been considered as key to the successful diffusion of innovations.

Finally, the literature on the management of change and organizational development (OD) also reflects on the issue in hand, and contributes important insights for further reflections. Taleb (2007, p.57) critically looks at the research inclination towards mechanistically using statistics for problem solving. He warns by saying that “statistics can fool you. In fact it is fooling your government right now. It can even bankrupt the system... we are riding in bus driven by blindfolded driver”. Grieves (2010, p.44) further comments saying that “the real problem arises when people use statistical models designed to measure causal variable for nonlinear situations with complicated variables that do not possess direct and observable causality.” The drawback of traditional approaches has been pointed out as their inherent policy desire and research inclination to force complex data into neat causal categories, in an attempt of simplification and predictability of complex situations. Other processual researchers also refer to the emergent and integrationist models of change, which contrast with planned change (OD) models. These models “view major change as a non-linear, interactive process in which outcomes are shaped by the way people interpret and act on their contemporary and historical contexts” (Boddy, 2000: p.284). Boddy (2000: p.31) comments that the “Managers have minds of their own, as do the people who work with and for them. They decide which technologies to develop, promote and install to further their interests. Others decide the details of how they will use or react to it — again in the light of their interests. In this view, technology is a dependent variable, reflecting the interplay of forces within and around the organization. The effects are uncertain, as they are heavily influenced by human choices”. He further argues that “the continual process of action, reaction, and synthesis produces results quite different from those which the people promoting the change originally expected”. Grieves (2010, p.94) debates that “because some actors and groups have greater access to, and control over information, they can manipulate situations to their advantage. Technology can be used to control people”. The disproportionate access and use of ICT services (i.e. the ‘digital divide’) then inherently leads to their differential scale of holding power and capacity to exert influence on others; thus the ultimate capability of controlling the critical resources and human minds.

In the same context, Dawson (1994) argues in favor of generating ‘poly-vocal pluralistic accounts’ to uncover the political and historical dimensions by investigating accounts that are normally silent in official versions of the proposed change. Thus he insists that “the researcher should reveal all silenced and otherwise excluded voices, and not just report the loud, articulate, respectable, or directive ones”. Processual researchers should therefore learn how to articulate the resultant narratives and illustrate competing narratives and struggles between various groups with different interests; so that they could better reflect on the study of unintended consequences (Grieves, 2010: p.94). Buchanan and Dawson (2007, p.273) further takes this point to emphasize on the need to “unpack taken-for-granted realities, to uncover their complexities, lack of shared meaning, and hidden resistances… audiences must be aware of the motives and purposes of those who speak to them” (or act as representative on behalf of them in different forums or occasions). Thus they argue that in the presence of these emerging and conflicting accounts, the dream of ‘closure’ cannot be achieved thus “the notion of a single reality is illusionary, and such truth claims are suspect.” There is no such ‘absolute truth’ that exist in the human constructed translations, but actually they represent a social construction of a combination of different accounts of partial truths, which becomes the shape of a temporary reality within the given time and space. But that equilibrium doesn’t prove to be static for a longer period of time, and in result remains in a constant flux after the emergence of new events, actors, interests, and thus the renewed expectations. Hence, it leads the system to reach to a new closure on the revised terms based on a new state of ‘dynamic equilibrium’. This process continues until it satisfies the interests of the dominant and other influential stakeholders for an agreed timeframe.

THE THEORETICAL STANDPOINT – SOME CRITICAL REFLECTIONS

The diffusion process involves intertwined and intriguing interactions between the focal and mediating actors; hence resulting in different ‘competing or counter networks’. The ‘focal actors’ include the policy makers, regulatory authorities and telecom suppliers (vendors and network operators). The end-users should also be considered among the focal actors if their mandate and role in a society is found to be more than just being passive recipients (acceptors or rejecters), and if they have the possibility to contribute in shaping and designing the technological artifacts, innovations and offered services. The ‘mediators’ on the other hand are those actors who play a significant
role in facilitating (or otherwise retarding) the smooth and effective diffusion of telecom services. The list of mediators may include the ‘virtual’ network operators (e.g. MVNOs, resellers, and small ISPs\(^2\) who do not own their own network facilities), equipment manufacturers or vendors, content developers/aggregators, solution providers, consumer associations, social pressure groups, print and electronic media, politicians, bureaucracy, armed forces, security agencies, Non-Governmental Organizations (NGOs), standardization organizations, labor and trade unions, industrial associations and consortiums, financial bodies (e.g. banks, venture capital firms, private investors, business angels), legal institutions (courts), and the academic and research institutions.

The various actors and their associated competing networks pursue different and often conflicting social, political and economic agendas in order to promote and protect their own vested interests. To fully understand the reasons why do some services smoothly and rapidly diffuse in comparison to other services, we need to go further in depth to comprehend the ongoing ‘translation’ processes through digging out the ‘multiple versions of partial truths’ or the ‘different shades of the reality’ held by those different focal actors and mediators. This would help us exploring the formation of ‘interest alignment’ between the different ‘nodes’ (actors and mediators) through identifying the multiple ‘linkages’ (communication channels) between those connected nodes. When we speak to them in order to get their accounts on different issues, they often come up with various conflicting stories and different versions of the partial ‘truths’, perceived by each of them as the original version of the presumed ‘reality’.

Hence, the main purpose of the diffusion research should not be to explore or identify the ‘truth’ itself, while considering it to be an objective fact or reality, but rather the aim should be to highlight and bring into notice the inherent complexities and challenges faced by the researcher in the struggle of understanding the truth or reality. The reality is not something to be ‘objectively’ searched for, or something that could be presumed existing ‘out there in the field’ to be fetched for the readers; but in fact it is a ‘socially constructed’ entity made out of the multiple versions of the ‘partial truths’, as essentially led or promoted by a range of social, political and economic interest groups in disguise of various ‘shielded covers’. The diffusion research thus should aim at dealing with this dilemma, to be able to delicately unfold the ‘different shades’ of the reality.

The past research on ICT diffusion analyses conducted from the structural-functional, statistical and systemic perspectives largely presume the presence of a certain degree of stability and transparency in the research field, a certain scale of explicitness and genuineness in communications, and a certain level of ‘determinism’ (with an expectation for the controlled events and predictable outcomes) in a prevailing well-functioning ‘systemic’ framework. However, these characteristics are either totally absent or extremely lacking in the research environment referred here as the ‘complex socio-economic context’. On the contrary, the referred complex socio-economic and political context is known for having relatively a high degree of chaos, an inherent uncertainty, a very low level of transparency, lack of coordination, institutional inefficiency and ineffectiveness, lack of basic physical infrastructure and living facilities, missing an explicit and uniform parameter or mechanism to handle all cases on the merit bases, either an utter absence or having very weak democratic institutions, the lack of ‘social capital’ and social cohesion, lack of explicitness due to highly vague and confusing patterns of communications, and the presence of multiple versions, stories and differing understandings of even the well-documented texts (e.g. policies, regulations and constitutional articles).

In fact, it seems like deliberately maintaining this fuzzy and chaotic scenario with confusing translations and blurring boundaries in the presence of an ‘unheard noisy’ background (of marketing and propaganda campaigns) suits well to those whose interests lay in keeping the masses ‘ignorant’, and thus keeping them out of the ‘power struggle’ through strangling their democratic voices in the shaping and construction of technologies and in the subsequent patterns of their diffusion and adoption; not only in terms of ‘inscribing’ the desired meanings in the constructed technological artifacts, but also in terms of the resulting benefits and impacts expected to be received by the users; due to their differential scale of access to those technologies and significantly varied ability to effective adoption and usage of ICT services. Hence, in result of the currently observed constantly widening ‘digital divide’; the powerful groups are seen to be likely benefited in maintaining their ‘status quo’ and the existing social, political and economic divides between the masses and classes, in order to uphold their control over the society.

Keeping the above discussed facts in mind, conducting a research that essentially aims at the successful diffusion and adoption of technologically complex products, such as ICT services, would thus demand a whole different set of skills, expertise and approach on behalf of the diffusion analysts (researchers), policy makers,

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\(^2\) MVNO and ISP stand for ‘Mobile Virtual Network Operator’; and ‘Internet Service Provider’ respectively
regulators and suppliers. Hence, it demands for being equipped with both a high level of vigor and at the same time a high degree of 'sensitivity' towards the research environment and its inherent complexities. It is because the effective diffusion and useful adoption of ICT services is not considered here merely a marketing campaign or just a commercial process, but ideally it should have encompassed much bigger research agenda in order to include the debates related to: technological awareness of the masses, their educational and social uplift, and the economic and political empowerment of traditionally (historically) the impoverished and suppressed segments of the society. Thus, our agenda and campaign for the impact study shouldn’t confine itself merely to statistical analysis in finding the patterns of the diffusion and adoption of ICT services; but it should also aim to investigate the positive and negative impacts of the adoption and use of those diffused services in terms of creating awareness among the masses, seeking new possibilities for their educational development, looking for improvements in their social conditions, and gauging the presence of equal opportunities for their sustainable economic growth and political empowerment.

Thus it is argued here that the diffusion of telecom services cannot be studied in a linear way by independently focusing on the different interconnected dimensions of diffusion research in isolation to each other, such as: statistical dimensions (e.g. teledensity factor, growth indicators, market forecasting), technological comparisons (between different ICT systems, products, services and standards), cross-country comparative benchmarking, affordability issues, market awareness challenges, ‘digital divide’ concerns, ‘accessibility’ and connectivity debates, ‘usability’ studies, and impact analysis. This paper debates that all these different dimensions together make the diffusion analysis a multifaceted research area, which incorporates the whole range of those debatable and contestable issues as well-integrated and intertwined parts of this unified body of the diffusion research. The current research declines any attempt of isolating those issues from each other or trying to address one issue at a time for the sake of simplicity through forcefully delineating boundaries between them. It is believed that adopting a linear approach towards diffusion research would rather result in offering an inconclusive and partial solution to addressing the complex issues related to the adoption and use of ICT services.

On the contrary, this discussion considers the diffusion of ICT services as an integrated research area, primarily composed of three overlapping features i.e. ‘accessibility’, ‘affordability’ and ‘usability’. ‘Accessibility’ defines the scale of connectivity of a society either at an individual household (personal) level or at the community (shared-mode access) level. The ‘affordability’ defines the purchasing power of a targeted community to comfortably subscribe and frequently make use of the delivered telecom services. Finally, the ‘usability’ factor defines the market ‘willingness’ to pay for the delivered services, as it is essentially determined by the market ‘readiness’ (after resolving the ‘affordability’ issue) i.e. how well the end-users effectively understand and capable of adopting the useful and relevant ICT applications in their own ‘contexts of usage’. Thus the proposed usability study should focus on investigating the fact if the targeted community of adoption does possess the minimum competence and technical skills necessarily required to effectively make an effective use of those services. Such studies should be regularly conducted through employing periodic reviews and surveys to fully comprehend the impact analyses at an individual, group, organizational and societal level. This debate assumes that through incorporating these three integrated elements of the diffusion research into the study would likely deliver a relatively more comprehensive and robust account to comprehend the complexities involved in the smooth, rapid and effective diffusion/ adoption of telecom services in any specific user context.

This paper also emphasizes on disclosing the socially ‘constructed realities’ through an impartial analysis of the competing translations to fully understand the reasons behind the relative successes or failures of different ICT services; in terms of their effective adoption and use, and the resulting impacts. Such a wider scope of diffusion research should ideally include the voices and concerns of the representatives of all major domains and stakeholders on the relevant issues; so that to facilitate their counterparts in understanding the market dynamics within a highly complex multi-actor environment. This deliberate attempt of opening the technological ‘black box’ by continuously engaging the concerned parties within a continuous and interactive social communication process, is expected to result in a better exposure to the real complexities, arguably involved in the diffusion and adoption of ICT telecom services in a complex socio-economic and political context.

**CONCERNING ISSUES FOR ‘ICT DIFFUSION ANALYSIS’**

Based on all the above theoretical discourses and critical reflections, it has been proposed here that the ‘diffusion analysis’ of ICT services, particularly in case of a complex socio-economic context should essentially cover the
following mentioned major elements/discussions to offer a comprehensive account for the academic and policy debates:

- ‘Industrial mapping’ in order to identify the whole range of involved (or associated) actors, their specific positions in the map, and the assigned roles in a given framework;
- Identifying all those potential forces, factors and reasons that may potentially influence the pace of the adoption and diffusion of telecom services in a specific socio-economic context;
- Making a comparative analysis of the relative diffusion patterns of ‘different’ telecom services within a ‘similar’ socio-economic context to identify those ‘service-specific’ attributes that potentially make the difference;
- Making a comparative analysis of the relative diffusion of ‘similar’ telecom services within the presumably ‘different’ socioeconomic contexts to identify those ‘context-specific’ attributes that potentially make the difference;
- Identifying the observed social, educational, political and economic impacts of the diffused telecom services in terms of the observed or potential change in the adopter’s level of competence, efficiency, participation & empowerment within the competitive and comparative scenarios;
- Understanding the competing 'translations', as essentially led by different 'focal' (leading) actors who strive to promote their own versions of 'truth'; in order to protect their specific social, political and economic interests or agendas, often associated with the particular patterns of the diffusion and adoption of ICT services in the given socio-economic context; and
- Making policy, regulatory and strategic recommendations in order to help designing an effective and optimal policy & regulatory framework, and a strategic roadmap capable of addressing the challenges identified in the above analysis.

CONCLUSIONS

The above discussions clearly reflect the need for a ‘renewed focus’ within the scholarly discourses at the academic, industrial, policy and regulatory levels. It demands to broaden the designed analytical framework in order to fully comprehend the complexities involved in the process of diffusion and adoption of ICT services. It requires going in depth to profoundly grasp and understand the underlying translations and interest-driven associations taking place between the ‘focal actors’ and ‘mediators’ during the diffusion process. This is arguably as much a social and political process, as it is conventionally assumed to be a technical and commercial one; hence their ability of mutual shaping of each other during the innovation development and its subsequent diffusion cannot be ignored or undermined. Such a broadened focus and an extended analytical framework is expected to help the policy makers, regulators and suppliers in developing the required policy and regulatory vision at the one hand, and the technological and strategic insights on the other hand; in order to effectively address many of those yet unanswered research questions and innovation dilemmas, when dealing with the successful diffusion and effective adoption of ICT products and services in a socio-economically complex field of analysis.

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