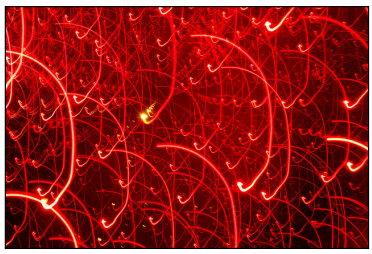
Technology Innovation Management Review

August 2015
Volume 5 Issue 8



Insights

Welcome to the August 2015 issue of the *Technology Innovation Management Review*. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

Carleton UNIVERSITY

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Technology Innovation Management Review

August 2015
Volume 5 Issue 8

Publisher

The *Technology Innovation Management Review* is a monthly publication of the Talent First Network.

ISSN

1927-0321

Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

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About TIM

The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; timprogram.ca), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: Insights

Chris McPhee, Editor-in-Chief

Welcome to the August 2015 issue of the *Technology Innovation Management Review*. In this issue, authors from Canada, Finland, Palestine, India, and New Zealand present insights about enterprise gamification; business, knowledge, and innovation ecosystems; technological public–private innovation networks; women entrepreneurship in developing countries; and strategy communication.

In the first article, **Umar Ruhi**, Assistant Professor of Information Systems and E-Business Technologies at the Telfer School of Management at the University of Ottawa, Canada, adapts the mechanics, dynamics, and aesthetics (MDA) framework for enterprise gamification. The framework illustrates how gamification leverages human psychology using technology platforms and motivates individual behaviours that drive organizational outcomes. Based on the presented framework, the article includes guidelines for the management of gamification initiatives and the design of gamification applications.

Next, **Katri Valkokari**, Principal Scientist at the Technical Research Centre of Finland (VTT), examines the ecosystem metaphor as it is applied in the concepts of business, knowledge, and innovation ecosystems. The article describes each type of ecosystem and how they differ in terms of their outcomes, interactions, logic of action, and actor roles. The analysis is intended to help practitioners understand what different forms of interactions may be required in different ecosystems.

Morrar Rabeh, Assistant Professor of Innovation Economics at An-Najah National University in Nablus, Palestine, examines the literature on innovation networks to develop a conceptual framework that describes the structure and mechanism of interaction in technological public–private innovation networks, or TechPPINs. The framework shows the innovation process as an outcome of a collaborative relationship between heterogeneous public and private actors to produce new technological outputs.

Then, **Hina Shah**, entrepreneur and Director of the International Centre for Entrepreneurship and Career Development (ICECD) in Ahmedabad, India, and Punit Saurabh, Senior Faculty Member at the ICECD, share insights about women entrepreneurship development programs in developing nations. Specifically, they examine the challenges and regional variations facing women entrepreneurs in South Asia and identifies nine areas where such programs can be strengthened towards the ultimate goal of poverty alleviation.

Finally, this issue includes a summary of a recent TIM Lecture presented by **Stephen Cummings**, Professor of Strategic Management at Victoria University of Wellington in New Zealand. Cummings presented some of his recent research into strategic management and creativity, emphasizing why leading creative organizations (or organizations that seek to be creative) should map their strategy graphically. Part of the lecture was based on the approaches that Cummings and his colleague Duncan Angwin developed in their new book *Strategy Builder: How to Create and Communicate More Effective Strategies* (2015). A discount of 30% is available to TIM Review readers who order the book from Wiley.com (wiley.com/go/strategybuilder) using the code VBK24.

For our September issue and other future issues, we are accepting general submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies and solving practical problems in emerging domains. Please contact us (timreview.ca/contact) with potential article topics and submissions.

We hope you enjoy this issue of the TIM Review and will share your comments online.

Chris McPhee
Editor-in-Chief

Editorial: Insights

Chris McPhee

About the Editor

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. He holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa, Canada, and BScH and MSc degrees in Biology from Queen's University in Kingston, Canada. Chris has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

Citation: McPhee, C. 2015. Editorial: Insights. *Technology Innovation Management Review*, 5(8) 3–4. http://timreview.ca/article/917

Keywords: enterprise gamification, business ecosystems, knowledge ecosystems, innovation ecosystems; public–private innovation networks; women entrepreneurship, developing countries, poverty alleviation, strategy communication, drawing

Level Up Your Strategy: Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

> *"Good design is making something intelligible and memorable. Great design is making something memorable and meaningful."*
>
> Dieter Rams
> Industrial Designer

Gamification initiatives are currently top-of-mind for many organizations seeking to engage their employees in creative ways, improve their productivity, and drive positive behavioural outcomes in their workforce – ultimately leading to positive business outcomes on the whole. Despite its touted benefits, little empirical research has been done to date to investigate technological and individual personal factors that determine the success or failure of enterprise gamification initiatives. In this article, we provide a summary of our preliminary research findings from three case studies of gamification initiatives across different business contexts and present an empirically validated descriptive framework that details the key success factors for enterprise gamification. Our adaptation of the mechanics, dynamics, and aesthetics (MDA) framework for enterprise gamification aims to explicate the connections between end-user motivations, interactive gameplay elements, and technology features and functions that constitute effective gamification interventions in the enterprise. Following a discussion of the core elements in the framework and their interrelationships, the implications of our research are presented in the form of guidelines for the management and design of gamification initiatives and applications. The research findings presented in this article can potentially aid in the development of game mechanics that translate into positive user experiences and foster higher levels of employee engagement. Additionally, our research findings provide insights on key success factors for the effective adoption and institutionalization of enterprise gamification initiatives in organizations, and subsequently help them enhance the performance of their employees and drive positive business outcomes.

Introduction

As a relatively new breed of technology-based intervention, gamification refers to the process of utilizing a digital platform to incorporate game-like elements in non-game contexts with the aim to positively influence user motivation and to improve user engagement in desired behaviours. In an enterprise setting, gamification techniques may be applied to engage employees in helping an organization realize business process improvements, service efficiencies, talent development, innovative research ideas, and constructive collaboration practices.

Although the hype surrounding enterprise gamification has not yet receded, some early adopters have reported failures with gamification initiatives (Burke, 2014). Their experience has afforded more credence to those who question the potential of gamification – whether it constitutes a trivialization of work and whether it is a frivolous diversion.

To counter these negative accounts, analysts and experts have directed attention to the myriad of success stories that demonstrate the benefits of gamification to organizations in various sectors including airlines, healthcare, financial services, consumer products, and

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

education (Buggie, 2014; Palmer et al., 2012; Wang, 2011). Consequently, these experts have expounded that organizations and their leaders need to avoid jumping on the gamification bandwagon and not use it in a knee-jerk fashion to coerce behaviour and outcomes. Rather, organizations and leaders are urged to understand the business case for gamification, appreciate the opportunities and limitations associated with it, and approach the implementation of technologies within the firm's specific organizational and individual context. Attention has been drawn to factors – such as business objectives, employee motivations, and user experience – that constitute key determinants in the effective adoption of enterprise gamification programs. However, owing to the novel nature of gamification and its emergent corporate use cases, there is a general dearth of academic and industry literature explaining these issues (Deterding et al., 2013; Hamari et al., 2014).

In this article, we address this research gap by reporting some emergent findings from our ongoing research on enterprise gamification. We investigated gamification initiatives at three case study organizations from different industries, and conducted interviews with strategy and design teams, evaluated the implementation of gamification applications, and surveyed end users from the organizations. Figure 1 summarizes the case study organizations that we surveyed for our research and the specific methods that we followed to obtain data and derive insights about gamification initiatives in these organizations. To preserve confidentiality of information, we only report the general industry of case study organizations using the North American Industry Classification System (NAICS) and provide a generic context of the gamification applications being used by the case study organization.

In the sections that follow, we provide a summary of the preliminary findings from our research program. First, we offer a working definition of meaningful enterprise gamification and summarize its conceptual underpinnings. Next, we discuss our adaptation of the mechanics, dynamics, and aesthetics (MDA) framework – a descriptive framework that highlights various elements of meaningful enterprise gamification, and provides an overall synopsis of strategy, design, and user experience elements from gamification initiatives and applications across the three case study organizations that we surveyed. The framework is geared towards explaining how gamification leverages human psychology using technology platforms and motivates individual behaviours that drive organizational outcomes. Finally, drawing upon the descriptive framework, we provide guidelines for the management of gamification initiatives and the design of gamification applications.

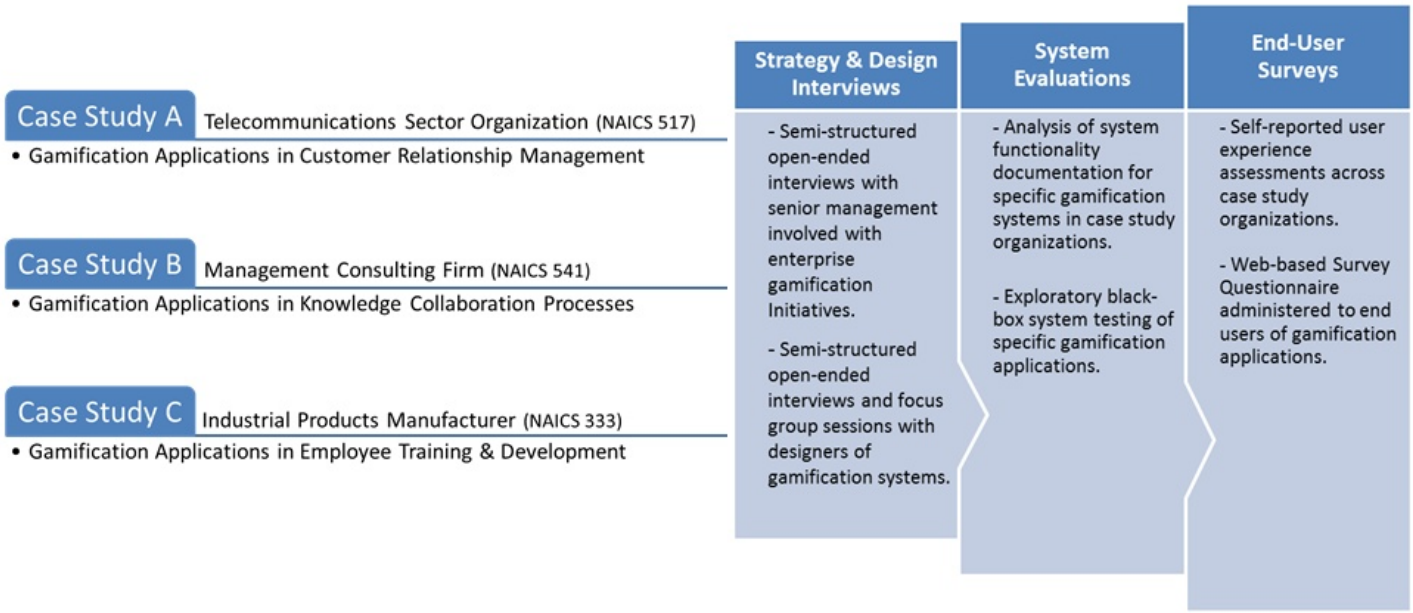

Figure 1. Case study organizations and data collection methods in our study

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

Defining Meaningful Enterprise Gamification

As an innovative technology-based intervention, gamification entails the integration of game-like elements (game mechanics) in non-game contexts with the aim of driving positive behavioural outcomes in a target audience (Deterding et al., 2011; Hamari et al., 2014; Huotari & Hamari, 2012; Werbach, 2014). On the outset, the concept of gamification should not be confused with traditional games that are simply directed towards providing entertainment value, nor should it be mistaken for reward systems that simply entice people to perform actions to earn points. Although elements such as points, levels, leaderboards, achievements, and badges can certainly constitute components of a gamified experience (i.e., game mechanics, as described in later sections), this overall experience should be geared towards non-game situations and towards persuading end users towards intended behavioural outcomes. In the organizational context, gamification has been shown to enhance employee engagement and produce desired business outcomes in a variety of business functions including marketing, logistics, human resources, customer service, and knowledge collaboration (Buggie et al., 2014; Hense et al., 2014; Meister, 2013; Post, 2014; Sayeed & Meraj, 2013; Werbach, 2014; Wood & Reiners, 2012).

We use the term "meaningful" gamification in an enterprise context to refer to corporate scenarios where game thinking and game-based tools are used in a strategic manner to integrate with existing business processes or information systems, and these techniques are used to help drive positive employee and organizational outcomes.

Meaningful gamification should be a principal consideration for any gamification strategy to help sustain intended employee behaviours over the long term given that some early experiences of organizations have shown that, once people become bored of the gamified environments, they may not engage in the intended behaviour at all (Burke, 2014). A theoretical explanation of this phenomenon is grounded in self-determination theory (SDT) (Deci & Ryan, 2004), which suggests that, if rewards are used to encourage a behaviour that a person already has some intrinsic motivation towards, those behaviours are less likely to be observed once the rewards are removed or not perceived as valuable by that person. Hence, the key take-away for enterprise gamification is to ensure that game design elements should aim to increase intrinsic motivation among their audience. Such meaningful gamification can only be achieved with the realization that no single gamification system can cater to all users – rather, the system should be capable of providing multiple gratifications to end users, and offer features and functions that are aligned with various types of employee motivations to use the system. The next section discusses a descriptive framework that explains these factors with the aim of helping organizations think more deeply about gamification initiatives and facilitate connections between gamification application functions and end-user motivations to use those functions.

The MDA Framework for Meaningful Enterprise Gamification

Despite the difference between traditional games and gamified systems, in defining the latter, researchers and practitioners have drawn upon formalized theoretical game design concepts such as the *mechanics, dynamics, and aesthetics* (MDA) framework (Hunicke et al., 2004; LeBlanc, 2005). *Mechanics* describe the particular rules and components of the game in terms of what actions players can undertake; the processes that drive user actions; and the conditions for progress and advancement. *Dynamics* describe how the rules manifest during actual gameplay (run-time) based on the players' inputs to the system as well as interactions among players. *Aesthetics* describe the desirable emotional responses evoked in the users when they interact with the gamified system. The MDA framework also helps in conceptualizing the relationship of the designer and the player. The designer constructs the functions and features (mechanics) of the game, which spawn different types of system–user interaction behaviour (dynamics) and lead to particular end-user emotions and experiences (aesthetics). Hence, the designer's perspective links mechanics to dynamics and subsequently aesthetics, whereas end users formulate their experiences based on the aesthetics and they engage in specific activities towards satisfying their favoured gratifications.

The MDA framework has been adopted and modified by other authors to fit the specific context of gamification, for example, the mechanics, dynamics, emotions (MDE) framework by Robson and colleagues (2015), and the design, play, experience (DPE) framework by Winn (2007). However, these and other models in the extant academic literature are primarily conceptual in nature, and to our knowledge, no empirically validated models have been published in the context of enterprise gamification. The findings from our research program aim to help address this gap.

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

In our preliminary research with our case study organizations, we have found the MDA framework to be a viable basis for describing the elements of enterprise gamification in a structured fashion. In our research, we have surveyed organizations from different industries utilizing gamified systems to facilitate various business practices such as customer service, knowledge collaboration, and employee training and development. Across these contexts, we have found various commonalities in the strategic requirements, system design, and user-experience elements that characterize enterprise gamification initiatives, and the MDA framework facilitates our discussion of these concepts. Our adaptation of the MDA framework is shown in Figure 2 along with empirically validated examples of mechanics, dynamics, and aesthetics that emerged in our research findings. To aid the discussion and understanding of our framework, we logically categorized the concepts in our framework as *the 20 Cs of meaningful enterprise gamification*. We do not claim that our framework comprehensively captures all aspects of enterprise gamification. It is simply an emergent framework based on specific case studies in our research program. Nonetheless, we hope that our framework offers some guiding principles for future enterprise gamification initiatives.

Additionally, our adaptation of the MDA framework incorporates the concepts of game narratives (embedded, emergent, and interpreted) that help delineate between designer and end-user perspectives of the gamification application. We explicate these concepts in the next sections by highlighting some key examples from our case studies.

Note that we deliberately use "end user" as our term of choice for consumers of enterprise gamification. Unlike in traditional games, where the term "player" is commonly used to denote a dedicated consumer role, the application consumer assumes a broader role as an employee in the context of enterprise gamification.

Game mechanics

At the level of game mechanics, the gamified systems we examined had very similar features and functions. *Components* such as points and badges represented basic achievements for end users who interacted with the system. For example, in the context of knowledge collaboration, a specific number of points or various types of badges would be awarded to people who have posted content or commented on questions posted by their colleagues. Leaderboards that visually display the current achievements of players in rank order were also

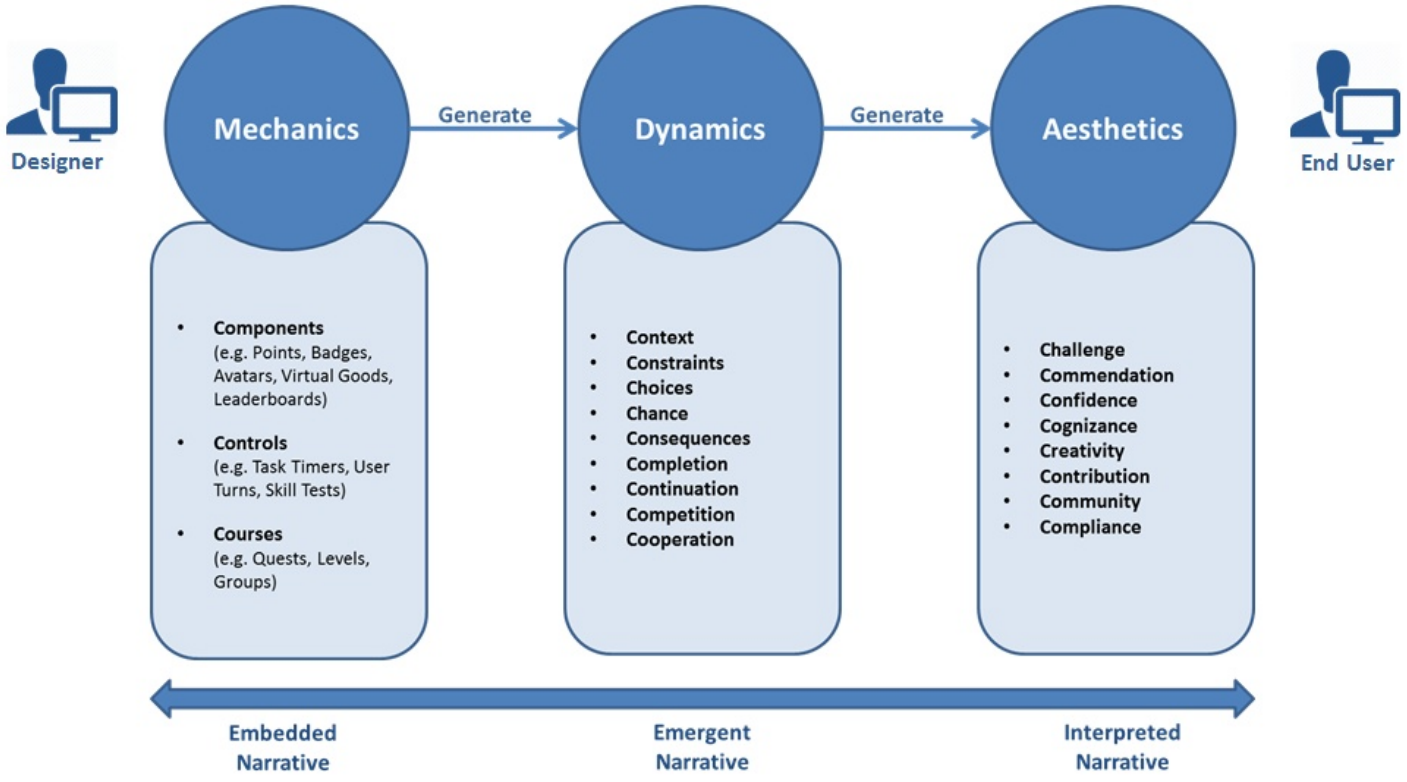

Figure 2. The MDA framework and the 20 Cs of meaningful enterprise gamification

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

fairly common among enterprise gamification systems. An example of such a system in a customer service context might entail assigning specific points for quick customer call resolutions and high customer satisfaction scores, and using these items to display the best customer service representatives on the leaderboard or to display employee dashboards with their itemized scores for various performance criteria.

Components in game mechanics are also often tied to different *courses* of action that would lead the player to higher levels on the leaderboard, and enable walkthroughs for users to allow them to unlock a sequence of relevant achievements. For instance, in training and development, completion of specific learning modules would be suggested to allow the player to proceed to the next level. Quests represent predefined challenges that typically have rewards associated with them. An example of quests that we observed in the gamified knowledge collaboration setting was the system bringing up knowledge-base articles that required further improvement or updates. These quests were linked to potential positive outcomes for the organization and often required players to collaborate with other key individuals with specific expertise in that subject area (hence incorporating group and teamwork elements).

Finally, game mechanics *controls* such as timers, turns, and tests can be used to provide cues to improve user performance. An example of controls in our study was the gamified knowledge collaboration process in which the system routinely suggested specific timelines for responding to online questions on the discussion forum, and rewarded individuals who responded within those suggested timelines. The training and development system also deployed test-based controls to facilitate employee progression across increasing stages of proficiency, and to display user accomplishments as employees overcame challenges associated with each stage.

Game dynamics

The game mechanics highlighted above can potentially enable different game dynamics as players interact with the gamified system. First, the *context* of the system establishes a cognitive anchoring point for players to recognize what types of activities they can undertake. For example, a monopoly-style environment for training and development that resembles the real-world board game can provide cues about specific tasks that comprise a challenge, and also encourage competition among players through a points-based system. Such a system might also have *constraints* on what players can and cannot do based on their current accumulated points and the difficulty level of the challenge. Randomness *(chance)* can also be introduced to make the gameplay more dynamic for end users, or to compel users to venture outside their comfort zones. An example of such a system that we observed in our study was an interactive customer call simulation that provided random customer complaint scenarios to be resolved through alternative means, with varied reward points associated with each step carried out by the end user. The simulation also provided dynamic feedback outlining the pros and cons of the choices made by the end users and the potential *consequences* of those choices.

The elements of *completion* and *continuation* were prevalent game dynamics across the gamification systems in our study. Progress bars indicating the proportion of completed steps in an activity or a dynamic map showing players their current and upcoming stages are some examples of such dynamics. These mechanisms help enable a sense of goal-orientation among end users and lead to feelings of satisfaction with each progress step, one notch at a time towards completion of a task or continuation to the next phase.

Together, the dynamics of consequences, completion, and continuation establish the basis for a feedback system in gamification to help drive changes in end user behaviour. Information about actions performed by end users should be linked to choices, and facilitate next steps by end users that would result in improved outcomes. As such, immediate feedback is regarded as a prerequisite to ensuring cognitive flow (i.e., a state of concentration or complete absorption with the activity at hand) (Csikszentmihalyi, 1990), which in itself is a determinant of end-user engagement.

In contrast to individual game dynamics, enterprise gamification environments also utilize collective or social dynamics including aspects of *competition* or *cooperation.* Some instances of these dynamics that we observed in our study have already been highlighted above, for example, competition among customer service representatives to achieve a higher status on the leaderboard or cooperation among subject matter experts to create or modify knowledge-base articles. Our research findings indicate that social game dynamics are more commonly exploited by end users who have relatively more experience with the gamified applications. Whether it involves working with others to achieve a mutually beneficial outcome (cooperation) or

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

optimizing one's own performance relative to other players (competition), social game dynamics typically require more commitment from end users and tend to operate on a longer-term basis as compared to individual game dynamics.

Game aesthetics

Game aesthetics represent the emotional response outcomes among end users as they participate in various activities in gamified applications. In the context of traditional games, these game aesthetics pertain to specific types of "fun" that players seek and experience during their interactions with the games, and a classification scheme for such experiences has been provided by various authors (cf. Hunicke et al., 2004; LeBlanc, 2005). In contrast to traditional games where players typically seek hedonic (entertainment or pleasure-related) gratifications, our research revealed that, in the context of enterprise gamification, end users mostly sought instrumental gratifications geared towards achieving specific valued outcomes such as learning and recognition. Hence, they saw gamification activities as a means to an end. As depicted in Figure 2, across our case studies, we uncovered eight concepts related to game aesthetics in enterprise gamification. These are briefly discussed below.

In terms of their own innate personal experiences, end users cited aspects such as challenge, confidence, cognizance, and creativity as appealing factors to participate in gamification-based activities. Many activities in gamified applications were presented in the form of *challenges* (e.g., puzzles, quizzes, difficulty levels) that required the end user to demonstrate decision-making and problem-solving skills and competencies. Through their interaction with the applications, many end users reported developing familiarity, gaining awareness, and grasping a better understanding of their business environment *(cognizance),* thinking outside the box *(creativity),* and ultimately growing their *confidence* at their workplace. A useful example of these emergent emotions and experiences was the previously highlighted simulated problematic customer call that employees needed to resolve through problem-solving skills and making dynamic decisions about next steps. End users reported that. through these exercises, they not only felt challenged to utilize their existing knowledge and skills, often in new and unanticipated ways, but the feedback provided by the gamification system also helped them understand the pros and cons of their actions and they felt better prepared to perform similar actions in their jobs.

On a more extrinsic level, end users also showed interest in gamification activities as enabling mechanisms to meet organizational standards and requirements *(compliance)* as well as to achieve recognition for their knowledge, skills, and abilities *(commendation).* For example, the completion of gamified training and development modules enabled employees to fulfil mandated training requirements, and also allowed them to showcase their credentials and be explicitly recognized for their expertise. These aspects were highly valued by end users because they often translated into immediate real-world benefits – perceived as useful "quick wins".

In addition to the self-oriented game aesthetics, our study also revealed social elements that can motivate end users to engage in enterprise gamification activities. By participating in group activities, employees reported valued emotions related to making *contributions* towards a collective goal and experiencing a sense of *community* with their colleagues in the organization. A specific instance of this in our study were employees who engaged in knowledge-collaboration activities such as answering questions on discussion forums or contributing to knowledge-base articles to document their experiences and help alleviate related problems and issues in the future. These employees reported a sense of achievement and satisfaction in helping other colleagues and their organizations.

Finally, with respect to gamification aesthetics, our analysis of end-user data across the three case study organizations rendered some key patterns in user experiences with gamification systems. As outlined in Table 1, some self-oriented aesthetics were reported with higher frequencies in the case of the gamified customer relationship management system, whereas social gratifications were more commonly reported in the case of the knowledge-collaboration system. However, emotional responses associated with confidence and cognizance were reported with high frequency across all three case study organizations. Furthermore, as highlighted earlier, some game aesthetics (especially social-oriented aesthetics) were more commonly reported by experienced end users, whereas beginners were more interested in individual game aesthetics such as commendation and compliance. Note that the relative frequencies in Table 1 are based on normalized proportions, where >60% = High; 40%–60% = Medium; and < 40% = Low. For example, in Case Study A, 24 end users were surveyed, out of which 18 cited motivations related to challenge (70%; High), 12 cited creativity (50%; Medium), and only 5 cited community (20%; Low).

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

Table 1. Relative frequencies (High; Medium; Low) of game aesthetics across case studies and end-user profiles

	Case Studies			End-User Profiles	
Aesthetics in Enterprise Gamification	**Case A: Customer Relationship Management**	**Case B: Knowledge Collaboration**	**Case C: Training and Development**	**Beginner End Users**	**Experienced End Users**
Challenge	H	M	M	L	M
Commendation	H	M	H	H	H
Confidence	H	H	H	M	H
Cognizance	H	H	H	M	M
Creativity	M	M	M	L	H
Contribution	M	H	L	L	M
Community	L	H	M	L	M
Compliance	M	L	H	H	M

The patterns in game aesthetics identified across the case studies also underline the fact that the experiences and emotional responses resulting from gamification activities are highly intertwined and not mutually exclusive. Furthermore, these experiences are highly dependent on the mindset and disposition of the players. Even within similar use cases, end users might have different referent aesthetics based on the gratifications they seek. What is common though is that end users seek these outcomes in the context of an enjoyable and fun experience, and an effective gamification platform should be able to deliver these game aesthetics within in a delightful or pleasurable manner.

Game Narratives and Designer versus End-User Perspectives

As depicted in Figure 1, an implicit facet of the MDA framework is that it facilitates a deliberation of differences between designer and player perspectives. As shown in Figure 1, designers who create gamified applications only have direct control over the features and functions constituting the mechanics of the game, and they work with system specifications (game mechanics) that would allow specific types of user interactions (game dynamics), and ultimately meet the organizational and end-user requirements of the gamified applications (game aesthetics). On the other hand, players view the system in terms of the goals they aspire to achieve and the gratifications they receive from these enterprise gamification applications (game aesthetics). Consequently, they engage in specific gamification activities (game dynamics) drawing upon their cognitive perceptions and affective attitudes (game aesthetics) and utilize system features that offer affordances (game mechanics) to participate in their desired gamification activities.

In traditional game design, the designer and player perspectives are also often delineated in terms of narratives (Jenkins, 2003). The *embedded narrative* represents the view of the game designer in terms of structured components and event sequences intentionally embedded in a system by the designers. Hence, embedded narratives align conceptually with game mechanics. *Emergent narratives* on the other hand are created by players during their interaction with the gamification application in a dynamic fashion as they perform different activities. In this way, emergent narratives correspond conceptually to game dynamics. Finally, an *interpreted narrative* characterizes the end user's ascribed meaningfulness of experiences with the gami-

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

fication activities. Given that these narratives are mental representations of the players, they are logically aligned with the concept of game aesthetics.

In our research, these narratives were abundantly clear: designers and end users often spoke about the same gamification elements in different ways. For example, in the training and development gamification application, the designer inscribed the need for groups-based reward systems such as team standings and how they are different from the individual points systems (embedded narrative). On the other hand, the end users who had participated in group activities and competitions talked about aspects such as "group pride" and "team rivalries" and how these feelings allow them to perform better (interpreted narrative).

An effective gamified experience needs to be coherent across the three types of narratives, and for organizations interested in gamification initiatives, both the feature-driven perspective of the designer and the experience-driven perspective of the player are important to consider. Business requirements, user profiles, and behavioural outcomes need to be deliberated thoroughly during the planning stages of gamification initiatives, whereas technologies, tools, and tactics that would effectively engage employees in gamification activities would be key considerations during the design and implementation stages. Table 2 summarizes designer and end-user perspectives of gamification elements juxtaposed with the three game narratives.

We also analyzed game narratives at the level of game dynamics and game aesthetics with the aim of identifying patterns among these elements in terms of their most commonly reported associations (by designers and end users). Figure 3 depicts the most frequently conveyed narrative associations in the form of a bipartite graph with game dynamics and game aesthetics as its vertices. The bipartite graph is based on adjacency matrices with qualitative codes pertaining to game dynamics and game aesthetics. Edges between vertices indicate a medium or high number of co-occurrences of codes (normalized relative frequencies). The graph-

Table 2. Summary of gamification elements from designer and end-user perspectives

Gamification Elements	Designer Perspective		End-User Perspective	
Mechanics	• Objects, rules, and algorithms that need to be developed for the gamification application • System specifications in terms of features and functions of the gamification platform	**Embedded Narrative**	• Gamification features and functions that act as affordances for motivational needs • System features that enable performance of activities	
Dynamics	• Projected user interactions and system responses • Utility of features and functions in delivering gameplay	**Emergent Narrative**	• Execution of planned activities to fulfill personal gratifications • Spontaneous opportunities to participate in activities that would satisfy motivations	
Aesthetics	• Business requirements and planned user-experience outcomes from gamified systems • Intended end-user responses to be evoked during gameplay		• Motivations to engage in gamification • Gratifications sought from gamified experiences • Meaningfulness ascribed to gamification experiences	**Interpreted Narrative**

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

based depiction offers a useful visualization aid in deciphering the prominence of different game dynamics and aesthetics.

Key highlights from this analysis include the important role of game dynamics related to *context* and *consequences*. As shown by the number of edges from these two vertices, context and consequences are key determinants in interactive gameplay, and consequently they play an important role in ensuring end-user engagement and the overall success of enterprise gamification initiatives. On the other hand, game aesthetics pertaining to *challenge* and *confidence* were reported quite frequently by end users with reference to gratifications sought from participating in gamification activities. Therefore, gamified applications need to incorporate features and cues to promote these experiential feelings among end users. Managers and designers involved in enterprise gamification initiatives should take these factors into consideration during the planning and development phases of gamification programs in their organizations.

Guidelines for Management

Drawing upon our research findings across the three case organizations and their gamification strategies and system implementation experiences, we are able to offer the following guidelines for management of gamification initiatives.

1. Align gamification initiatives with business objectives and intended behavioural outcomes.
Organizations interested in enterprise gamification need to think of it as a potential method to influence specific types of behaviour in their employees. It is still early days for enterprise gamification initiatives, and the hype surrounding gamification is leading some companies to seek out ways in which they can simply use features such as points, badges, and leaderboards in a bolt-on fashion on top of existing systems. Rather, they should begin by clearly defining business objectives, formalizing planned individual and organizational outcomes, and subsequently seeking gamification solutions aligned with these objectives and outcomes.

2. Integrate gamification strategically with business processes and information systems.
For gamification programs to be effective, game elements should be incorporated within existing business workflows and information systems that employees use on a regular basis, and the outcomes of gamification activities should connect to desired business goals. Toward this objective, the gamification system should be used to provide feedback to employees with clear calls to action on next steps, and these systems can also help

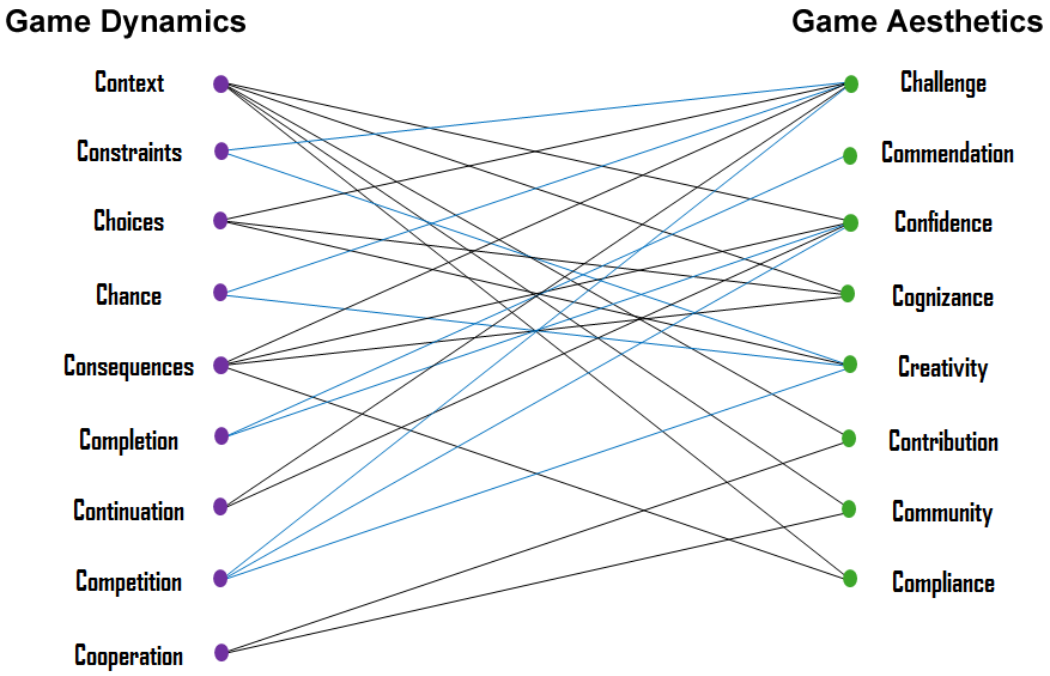

Figure 3. Game narratives depicted as a bipartite graph between game dynamics and game aesthetics

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

drive employee work compliance with corporate standards. Weaving in gamification activities and strategically placing them in the overall sequence of process events can help drive useful employee behaviours in the long term. Additionally, end-user data from gamification systems should be integrated with core information systems to allow the organization to track, reward, and recognize employees appropriately.

3. Partner and collaborate with experts.
Organizations need to remember that the primary purpose of building their gamification system is to engage employees and drive desired behaviours, and not to become the next great gaming company. Custom building gamified applications in-house may take more time, cost more, and entail more risk of failure as opposed to partnering with a vendor or consultant who has prior experience with building such systems and can advise on necessary requirements for success. Many vendors also provide a variety of white-label tools and customizable plug-and-play features that can help reduce the cycle time for implementation of gamification platforms.

4. Measure and report regularly, visibly, and broadly.
An essential component of gamification platforms is the measurement and reporting of data pertaining to end-user behaviour. Most gamification systems report such data to end users and their managers through different types of dashboards and reports. However, in order to drive long-term changes in employee behaviour, management needs to help employees understand the impact of their behaviours on the organization and visibly recognize and reward these behaviours through various offline mechanisms, perhaps using means such as corporate communication briefs or as part of employee performance reviews. Finally, metrics reported should be aligned with organizational outcomes, and it is important to communicate success often to help sustain momentum towards those outcomes.

Guidelines for Design

Several key success factors for the design of gamification systems have already been outlined in our discussion of the MDA framework. In this section, we offer a summary of those key success factors in the form of concrete guidelines for the design of enterprise gamification applications.

1. Design for engagement.
At the core of the need for gamification, engagement factors into all end-user motivations and holds the key to achieving success through gamification initiatives. Designers need to ensure engagement using a variety of means such as making the gamified experience entertaining, providing stimulating challenges and rewards, and visibly linking actions and achievements to make scoring and winning transparent to the end users. Crafting a creative storified context that is linked to the work environment can help motivate individuals to participate in enterprise gamification activities. Overall, the design should provide delightful end-user experiences and results-oriented fun while enabling employees to fulfil their specific motivations.

2. Design for personalization.
As highlighted in our discussion on game aesthetics, end users might exhibit different and sometimes varying motivations for using gamification systems. Hence, designers need to account for these various player needs, expectations, and preferences. Toward this objective, gamified applications should offer multiple mechanisms and options to reach the same organizational objectives, and to keep people with various skill levels motivated. Additionally, applications should offer a personalized interface to end users with not just their specific game statistics, but also feedback progress reports as well as suggestions for improvement or new activities based on their profile and performance metrics. Finally, end users should be situated contextually with a relevant referent group rather than broadly in relation to the entire organization. For example, rather than using organization-wide or departmental leaderboards, gamified applications can employ segmented leaderboards according to similarities in employee profiles or based on a basket of activities that are common among a specific group of employees.

3. Streamline the onboarding process.
To maximize the uptake of gamification applications, their design should explicitly be geared towards minimizing barriers for end-user participation. The invitation and calls to action for playing should be clear, rules and instructions should be brief, and the interface should be simple and visually appealing. Furthermore, the first few stages of gameplay should be relatively easy and produce quick wins for end users, allowing them to assimilate the application in their routine and also to internalize an initial sense of mastery that would subsequently lead to advanced gameplay and progressive skill building.

4. Plan, prototype, and playtest.
Effective design begins with proper planning and cyclical improvements based on system testing and user feed-

Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

back. Modelling using low-fidelity prototypes and storyboard mock-ups early in the design process and testing with sample end-user groups can help ensure that the gamified application would meet business objectives and satisfy individual outcomes. More formalized playtesting can be performed in later phases to allow a test group of end users to participate in gamification activities and provide their opinions. This process would be useful in identifying bugs and design flaws before releasing the application organization-wide, and would also help ensure that the application delivers the intended gameplay and spawns the desired end-user responses.

Conclusion

Our research aims to answer the call for additional research by human–computer interaction (HCI) researchers who have stressed the need for academics and practitioners to consider features and functions of gamification technologies vis-à-vis user experience processes that drive engagement at cognitive and affective levels (Deterding et al., 2013, Nicholson, 2012). Current industry literature on this subject usually only offers advice for adding gamification as a bolt-on application or service for existing business processes (Ferrara, 2012; Zichermann & Cunningham, 2011).

Our investigation into enterprise gamification has demonstrated that an effective gamification strategy and deliberated design of gamification applications have the potential to drive key organizational initiatives. However, in order to realize the full potential of gamification and achieve effective employee engagement, organizations need to think deeply about gamification initiatives and rationalize game elements in a structured fashion rather than thinking about gamification as simply the addition of a fun videogame layer on top of existing business process systems.

The empirically validated MDA framework for enterprise gamification presented in this article may offer a viable starting point and a practical tool for organizations to conceptualize their gamification initiatives using a systematic approach. The purpose of the framework is to facilitate the selection of technology features and the design of interactive, enjoyable gameplay that would integrate well with business processes, satisfy end-user motivations, and help drive positive individual behavioural and desired business productivity outcomes – resulting in meaningful enterprise gamification.

Recommended Reading

- ***Drive*** by Dan Pink offers useful background reading on the paradox of intrinsic versus extrinsic motivation. A solid understanding of these factors is a precondition for effective implementation and management of enterprise gamification initiatives. danpink.com/books/drive/

- ***A Theory of Fun for Game Design*** by Raph Koster describes several variations of fun that are possible in gamified systems. The book would be valuable to aspiring game designers because it helps connect the dots between game design elements and human experience outcomes. theoryoffun.com

- ***The Gamification Toolkit*** by Kevin Werbach and Dan Hunter offers a brief introduction to gamification by highlighting use cases and examples of game dynamics and mechanics in an enterprise setting. The book provides concise practical guidelines for managers and designers of gamified systems. wdp.wharton.upenn.edu/book/gamification-toolkit/

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Towards a Descriptive Framework for Meaningful Enterprise Gamification

Umar Ruhi

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Citation: Ruhi, U. 2015. Level Up Your Strategy: Towards a Descriptive Framework for Meaningful Enterprise Gamification. *Technology Innovation Management Review,* 5(8): 5–16. http://timreview.ca/article/918

Keywords: gamification, enterprise gamification, gameful design, mechanics, dynamics, aesthetics, human-computer interaction, user experience, persuasive technologies, behaviour change

Business, Innovation, and Knowledge Ecosystems: How They Differ and How to Survive and Thrive within Them

Katri Valkokari

> *"How dreadful... to be caught up in a game and have no idea of the rules."*
>
> Caroline Stevermer
> In *Sorcery & Cecelia or The Enchanted Chocolate Pot*

In management studies, the ecosystem metaphor is often utilized without clear definition and, thereby, several partially overlapping concepts such as industrial, business, service, innovation, and knowledge ecosystems have been introduced. The purpose of this conceptual article is to go beyond the confusion to define what is meant by different concepts regarding an ecosystem and especially describe the relationships between the three different ecosystem types: business, innovation, and knowledge ecosystems. The article contributes to the literature by describing how the ecosystem types differ in terms of their outcomes, interactions, logic of action, and actor roles. The results show that the three ecosystem types are interconnected from the viewpoint of the ecosystem actor. For practitioners, the article sheds more light on how the rules of the game (i.e., the logic of action) differ in the different types of ecosystems and demonstrates that different models are needed in order to operate in different ecosystems.

Introduction

The scope of ecosystem science extends from bounded systems such as watersheds to spatially complex landscapes, even to the Earth itself. Furthermore, research into biological ecosystems crosses temporal scales from seconds to millennia and links together several disciplines of biology. The ecosystem concept dates back to 1930 and, at various times, ecology researchers have focused on different aspects of its meaning (Willis, 1997). Social science has approached the economy as an ecosystem (Rothschild, 1990), viewing the global economy as an entity in which organizations and consumers are the living organisms. Starting from its (re)introduction two decades ago by Moore (1996), the ecosystem concept has also been actively discussed in management studies, bridging, for instance, system thinking and evolutionary economics. In management studies, a primary motivation for utilizing ecosystem concepts has been the desire to exploit self-organizing properties of natural ecosystems (Briscoe & Sadedin, 2007). Still, there are at least two drawbacks constraining the application of biological metaphors to research on economic activities: the intentionality of human activities and the possibility for actors in economic ecosystems to interbreed (Corallo & Propata, 2007). Both drawbacks are characteristic of man-made ecosystems and can, therefore, be utilized to describe the differences between ecosystem types. In management studies, meta-organizations such as ecosystems have been approached with different concepts (Gulati et al., 2012) and, previously, research has typically focused on one of the ecosystems only, when in the real-world systems the interest of actors (i.e., organisations) who are the ecosystem inhabitants and come bundled together with multiple parts (Muegge, 2013). Furthermore, institutional factors – the set of both formal and informal constraints, and enforcement characteristics that structure interactions – associated with participation is scarcely researched (Muegge, 2011; Smith, 2013). Thus, relationships and interactions between ecosystems types need to be analyzed at several levels in order to understand how connections flow between different ecosystems in the real business world.

Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

The natural as well as the man-made ecosystem is always unique – each ecosystem consists of a unique set of actors and interactions and thereby evolves in its own manner. In an ecosystem, each actor has their own role to play and, in this way, they view the partially overlapping ecosystems from their own unique perspective. Thus, as proposed by Weber and Hine (2015), rather than focusing on ecosystems as platforms, a model should be explored where ecosystems are viewed as structures of and relationships between interacting actors. The decisions and the related actions that are taken throughout the evolution of an ecosystem also shape its present and future state, as each decision provides raw material for subsequent decisions (David, 1985; Valkokari & Valkokari, 2014). Thus, ecosystems are dynamically evolving through interactions between ecosystem actors and should not be perceived from a deterministic or linear viewpoint (Wallner & Menrad, 2011). Furthermore, the economic ecosystem may consist of both networks of multiple firms and individuals, who are participating through different interaction mechanisms. Within management and innovation studies, there are several partially overlapping concepts – such as business, innovation, and knowledge ecosystems – to describe the meta-organizations between economic actors. This article sheds more light on how the different ecosystem types differ from each other in terms of their outcomes, interactions, logic of action, and actor roles. The purpose of this conceptual article is to clear up the confusion and define what is meant by the different concepts regarding an ecosystem, and especially to describe the relationships between the different ecosystem types. For practitioners, the article explains how the logic of action, or "the rules of the game", differ in the different types of ecosystems.

To attain this goal, the rest of the article is structured as follows. The next section reviews the research on ecosystems in management studies. Then, the relationships between different ecosystem types are discussed. Finally, the theoretical contribution is presented, together with the practical implications and an evaluation of the research and recommendations for further research.

Making Sense of Ecosystem Concepts

The system boundary definition is crucial for making sense of ecosystems (Gulati et al., 2012; Korhonen & Snäkin, 2005; Post et al., 2007). Thus, system boundaries can be set in several ways: by geographical scope (local vs. regional or national vs. global), by temporal scale (from history to future or static snapshots vs. dynamic interactions), by permeability (open vs. closed), as well as by types of flows (knowledge, value, material), which must be decided upon. In this conceptual article, the differentiation between the ecosystem concepts is based on the type of flow, which can also be approached as a *shared intention* or a baseline and outcome for each ecosystem as well as describing the cause of *interbreeding* within the ecosystem (Corallo & Propata, 2007). In other words, through interbreeding, ecosystem actors are able to constantly produce new outcomes by combining artefacts, skills, and ideas, and these different business, knowledge, and innovation outcomes distinguish the ecosystems from each other. Thus, Post and colleagues (2007) pointed out that space and time are intimately linked in any discussion of ecosystem boundaries; therefore, the geographical and temporal scales of ecosystems are also discussed in this article.

Three different economic ecosystem types are distinguished in this article. First, in the literature of *business ecosystems* as well as service or industrial ecosystems, the economic outcomes and business relationships between actors are highlighted. Second, the discussion of *innovation (eco)systems* and regional clusters focus on mechanism and policies fostering the creation of innovative startups around so-called regional hubs or clusters. Third, *knowledge ecosystems* have their main interest and outcome in creation of new knowledge through joint research work, collaboration, or the development of knowledge base.

In line with Moore (1996), the business ecosystem is here defined as “an economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world”. The strategic management literature focuses on business ecosystems as sources of competitive advantage for individual companies (Adner, 2012; Iansiti &Levien, 2004) and therefore the keystone and niche player have been defined as two key roles for companies in an ecosystem (Carbone, 2009; Smith, 2013). Thus, a shift of what is valued drives the need for the different models and reflects the terminology utilized in business ecosystem literature. Recently, within the emergence of service-dominant logic (S-D Logic) (Vargo & Lusch, 2011) and digital services (Thomas et al., 2014), the concept of service ecosystems has also been introduced. In this way, the dyadic or triadic collaboration between actors, and especially between customer and service provider, is highlighted. Furthermore, the concept of industrial

Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

ecosystems is connected to industrial symbiosis, focusing on the relations among companies in a direct waste/by-product exchange (e.g., Baas, 1998) or focusing on industrial parks (Côté & Hall, 1995).

Despite using the ecosystem concept, in several cases there is more a question of a (strategic) partnership between a platform owner (or a focal firm) and a provider of complementary assets. Thus, within the business ecosystem approach, in the same way as business (Halinen & Törnroos, 2005) or value (Allee, 2002) networks, the business ecosystem can be seen as a group of companies and other organizations, which simultaneously creates and captures value by combining its resources, while it operates around a focal firm or is linked to a platform (Milinkovich, 2008). The variety of actors is the major difference between the concepts of business networks and ecosystems, which are typically considered to include more actors than a network (Heikkilä & Kuivaniemi, 2012). As described already by Moore (1993), a business ecosystem is composed of several layers, which correspond to differing levels of commitment to the business. The ecosystem's core business layer consists of the parties forming the heart of the business: the business network actors such as suppliers, a focal firm, distributors, and customers.

In addition to industrial parks, clusters are also actively discussed within the concepts of innovation or knowledge ecosystems. The concept of industrial clusters, originally proposed by Porter (1990), highlights the competitive advantage at the regional level. Depending on the author, the basic idea of a cluster is either concentration and locality, or regionalism (Peltoniemi, 2004). The discussion has explored the mechanisms by which geographically clustered organizations benefit from their locations and collaboration (Almeida & Kogut, 1999; Claryssen et al., 2014; Coughlan, 2014). The main outcome of a knowledge ecosystem is new knowledge, and it could be shaped by pointing out the network nodes where the knowledge is created and retained (Quin et al., 1998). In other words, the main focus is exploration instead of exploitation. Open source communities are a well-known example of this ecosystem type based on knowledge exchange (Koening, 2012) and therefore recent research highlights how colocation can also mean virtual proximity, like emotional closeness, between the actors (Coughlan, 2014). On the other hand, the innovation ecosystem approach emphasizes fostering the creation of growth, interaction, and innovative startups around so-called knowledge hubs (Engel & del Palacio, 2011). For instance, Silicon Valley is often utilized as an example of success. Thus, within the innovation ecosystem, the financial network that supports the actors (both companies and research institutes and other technology developers) has recently been identified as one of the key success factors (Claryssen et al., 2014). There is an active discussion of value co-creation within boundary-spanning innovation and several concepts, such as "collaborative", "democratized", "open", "networked" or "co-" innovation have been introduced (Lee et al., 2012) and at least the technology-intensive business organizations, from specialized startups to diversified multinational enterprises, increasingly participate within ecosystems in different roles such as adopters and patrons of open platforms, and stewards and promoters of innovation communities (Muegge, 2011).

To sum up, in the real-world, present-day ecosystems are global and setting the ecosystem borders is a complicated issue. Still, studies of innovation or knowledge ecosystems have omitted this global dimension and focused on regional – geographically proximate – actors. In other words, regarding the geographical borders, the local ecosystem, such as a coral reef, is a sub-system of a broader ecosystem, a water system like a sea, and the changes in the broader system also have a growing influence in man-made ecosystems due to globalization, the development of information and communication technology, and deregulation. On the other hand, the changes inside the sub-systems also influence the emergence of changes in the "main" system and, thereby, the impacts are connected to the temporal borders between ecosystems. Anyhow, the question that often remains unresolved is how to develop mutually beneficial ecosystems, rather than "winner takes all" marketplaces or technology platforms, whose dominant players set the terms of coordination, collaboration, and competition.

Relationships Between the Ecosystem Types

There is different logic of action in the different ecosystem types (Claryssen et al., 2014) and the same actor can be involved and play different roles in each ecosystem (Figure 1). From the viewpoint of each individual actor, the interaction area between the ecosystem types and their relationships are different. Thus, highly mobile actors, platform owners, or keystone companies are examples of actors boosting the interaction between the ecosystem types. On the other hand, a platform – an organization of things such as technologies or complementary assets (Muegge, 2013) – also may be

Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

the interconnecting factor between the ecosystems. Because of these interconnectivity actors and platforms, ecosystems do interact with each other and therefore are evolving and emerging next to each other. Furthermore, there are both dyadic and triadic interactions between the different types of ecosystem, as indicated in Figure 1.

Table 1 summarizes the differences between the three ecosystem types in terms of their outcomes, interactions, actor roles, and logic of action. Business ecosystems focus on present customer value creation, and the large companies are typical key players within them. Knowledge ecosystems focus on the generation of new knowledge, and in this way research institutes and innovators, such as technology entrepreneurs, play a central role in these ecosystems. Innovation ecosystems occur as an integrating mechanism between the exploration of new knowledge and its exploitation for value co-creation in business ecosystems. Thus, innovation policymakers, local intermediators, innovation brokers, and funding organizations (such as venture capitalists or public funding agencies) are salient actors in innovation ecosystems.

All these ecosystems are dynamic, changing, and also changeable through ecosystem orchestration. Different organisms (i.e., species in natural ecosystems or actors with complementary roles in man-made ecosystems) are necessary to keep the ecosystem balanced, and removing one can cause a chain reaction felt throughout the entire ecosystem. Biological ecosystems are characterized by one or more equilibrium states, where a relatively stable set of conditions exist and maintain a population or nutrient exchange at particular levels. It is, however, important to note that the equilibrium of biological ecosystems is seldom optimal from the viewpoint of all species in the ecosystem. Thus, an ecosystem always induces both competition and cooperation, which leads to the selection and adaption of species. And, despite hitherto mainly positive approaches to man-made ecosystems, which have typically perceived ecosystems as positive and collaborative systems, that is also true within business, knowledge, and innovation ecosystems. Furthermore, ecosystems are often considered from a rather deterministic and linear viewpoint. According to Wallner and Menrad (2011), this linear view is focused on input factors that are supposed to directly influence outcomes, although "an ecosystem

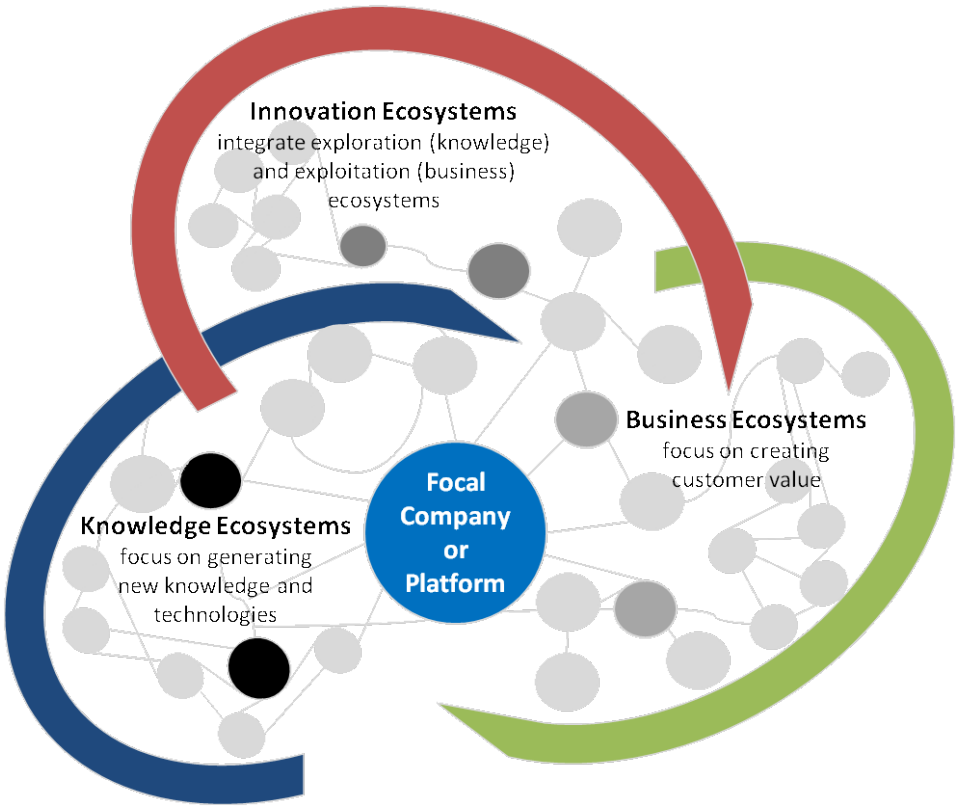

Figure 1. Relationships between overlapping ecosystem types

Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

Table 1. Characteristics of ecosystem types

	Business Ecosystems	Innovation Ecosystems	Knowledge Ecosystems
Baseline of Ecosystem	Resource exploitation for customer value	Co-creation of innovation	Knowledge exploration
Relationships and Connectivity	Global business relationships both competitive and co-operative	Geographically clustered actors, different levels of collaboration and openness	Decentralized and disturbed knowledge nodes, synergies through knowledge exchange
Actors and Roles	Suppliers, customers, and focal companies as a core, other actors more loosely involved	Innovation policymakers, local intermediators, innovation brokers, and funding organizations	Research institutes, innovators, and technology entrepreneurs serve as knowledge nodes
Logic of Action	A main actor that operates as a platform sharing resources, assets, and benefits or aggregates other actors together in the networked business operations	Geographically proximate actors interacting around hubs facilitated by intermediating actors	A large number of actors that are grouped around knowledge exchange or a central non-proprietary resource for the benefit of all actors

is not a trivial machine, with a defined input-output ratio". Thus, as distinct from biological ecosystems, some level of intentional organizing exists in man-made ecosystems: it shapes the attraction, selection, and retention of members of the ecosystem. The world of practice has been changing dramatically in a direction that places ever greater importance on coordination beyond the boundaries of the firm (Gulati et al., 2012; Muegge, 2013; Valkokari & Valkokari, 2014). Ecosystem actors have several reasons to stay together or actively participate in the orchestration of their ecosystem. The ecosystem inhabitants are unique entities based on their organizational routines, capabilities, and use of technology (Weber & Hine, 2015). Thus, the level of interaction and interdependencies in man-made ecosystems are multidimensional as the system-level goals bring actors close together. As biological ecosystems, these organisms coexist, collaborate, and coevolve via a complex set of symbiotic and reciprocal relationships, which together form a larger ecosystem. Interaction between the ecosystem actors strengthens the dependencies between them. Thus, the dependencies between the ecosystem participants are important influences on outcomes, success, and mobilization within an ecosystem (Adner & Kapoor, 2010).

The business ecosystem has been established around value co-creation and capture: the direct business benefits of ecosystem actors. Typically, the actors operate around a focal firm or are linked to a platform. If the ecosystem has a shared platform that acts as its locus of coordination, then platform technological features also have an important influence on ecosystem evolution (Iansiti & Levien, 2004; Thomas et al., 2014). The mobile ecosystems configured around dominant market players such as Apple, Samsung, and Nokia, and competition between them is a well-known example of business ecosystems. The variety of complementary resources is another important aspect in business ecosystems. Furthermore, counterpointing knowledge lays the foundations for knowledge ecosystems especially. The ecosystem is constituted from both providers and consumers that benefit from the interaction and are thereby intertwined together through even symbiotic relationships. In innovation ecosystems, intermediators play an important role in bridging the actors together and thereby facilitating interaction and building dependencies between them. In other words, it can be said that intermediators themselves form a platform in innovation ecosystems. In addition, on a temporal scale, the future-orientation of innovation ecosystem contrasts with the other concepts.

Conclusion

The way we perceive the business world around us is affected by our own experiences and is developed through sense-making from various models originating from management consulting or academic publications. The aim of this article was to define what is

Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

meant by different concepts regarding an ecosystem in management studies and especially describe the relationships between the three different ecosystem types: business, innovation, and knowledge ecosystems. The article contributed to the discussion by summarizing the differences and logic of action in the three ecosystem types. For practitioners, the paper sheds more light on the rules of the game required in living in and orchestrating different ecosystem types. Thus, an ecosystem approach anchored around understanding its inhabitants (i.e. actors, their roles, and their relationships) offers information that can be practically applied (Weber & Hine, 2015). In order to survive and thrive in an ecosystem, the essential point is to understand that different forms of interaction are required in different ecosystems.

Although formal authority is invisible in man-made ecosystems, this research highlights that they are not entirely self-organized: they are organizational designs that are held together on the condition that their members are in formal or informal agreement about shared purpose (baseline) and operation modes (logic of action). Still, understanding the coordination mechanism and its evolution over time is important, both for strategic decision making and the orchestration of ecosystems as well as building roadmaps for their future evolution. First, business ecosystems focus on present customer value creation, and large companies are typical key players within them. Second, knowledge ecosystems focus on the generation of new knowledge, and research institutes and innovators, such as technology entrepreneurs, play a central role in these ecosystems. Third, innovation ecosystems occur as an integrating mechanism between the exploration of new knowledge and its exploitation for value co-creation in business ecosystems. The relationships and the dynamics between overlapping ecosystems is an important research theme, and we need to create tools to enable crossing borders between the ecosystems. Therefore, food webs may provide a powerful framework for further research addressing the infrastructure that link population dynamics (actors) and community structure (relationships) to ecosystem function because they can represent both species interactions within a community and energy flow through those species (Post et al., 2007). On the other hand, an engrossing avenue for further research is the emergence of an ecosystem, because researchers and practitioners tend to assume that the ecosystems already exist and the temporal dimensions remains un-researched. Within this research theme, we could also benefit from the research of dispersion in biological ecosystems.

To conclude, scholarly work on the various forms of multi-actor assemblages is largely disconnected and shows only few signs of convergence (Gulati et al., 2012; Muegge, 2013). Although the authors with different roots utilize different ecosystem concepts, they agree that further research is needed in order to investigate more thoroughly the mechanisms and rules governing the interaction within ecosystems (Koening, 2012). In particular, the interaction between the different types of ecosystem is an unexplored area, and also further empirical research is needed to explore how ecosystem actors perceive their concurrent roles in different ecosystems.

Acknowledgements

The author would like to thank both the anonymous reviewer and the editor; their comments helped to clarify the focus and implications of the article. The research work is part of the research program "Towards Relational Business Practices" (REBUS), which is one of the research programs of the Finnish Metals and Engineering Competence Cluster (FIMECC).

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Business, Innovation, and Knowledge Ecosystems

Katri Valkokari

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Katri Valkokari

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Keywords: business ecosystem, innovation ecosystem, knowledge ecosystem, man-made ecosystem, ecosystem, platforms, communities, conceptual paper, logic of action

Technological Public–Private Innovation Networks: A Conceptual Framework Describing Their Structure and Mechanism of Interaction

Rabeh Morrar

> "*Innovation is not an isolated process of individuals or firms but is the outcome of the interaction between firms, customers, suppliers, competitors and various other private and public organizations in a system.*"
>
> Bengt-Åke Lundvall
> Organizational theorist
> In *National Systems of Innovation (1992)*

Technological public–private innovation networks, or TechPPINs, enable cooperation between public and private actors in a complex, dynamic, social, and interactive network structure. In this article, the literature on innovation networks is used to construct a conceptual framework that describes the structure and mechanism of interaction in technological public–private innovation networks. In the framework, innovation is created through a dynamic process of interaction between the public and private actors along the network lifecycle. In each stage of network lifecycle, social capital enables various interactions to occur and different modes and quantities of knowledge and technological resources to be exchanged and reinforced. Through a combination of the product lifecycle model and social network analysis, the structure of technological public-private innovation networks are examined at each stage of the lifecycle to reveal information about how the roles of public and private actors are embodied.

Introduction

The last 20 years have witnessed different forms of collaborative relationships that have been theorized, for example, in terms of innovation systems, innovation networks, and innovation clusters (e.g., Edquist, 1997; Freeman, 1987, 1995; Hamdouch, 2009; Lundvall, 1992; Nelson, 1993). Recently, collaboration between public and private actors has extended from production-oriented public–private partnership to include innovation-oriented public–private partnership (Gallouj et al., 2013), and public–private innovation networks, or PPINs. In these new concepts, public and private organizations cooperate to access complementary cognitive resources (e.g., knowledge and technological resources, information, skills, and know-how), which are mainly employed to develop and diffuse innovation outputs.

Innovation-oriented cooperation between public and private actors has emerged, in part, due to the substantial growth in knowledge and technology accompanied by globalization and the invasive character of the new informational paradigm. Public–private innovation networks mobilize complex knowledge and technology to produce new artefacts or technological innovation, mainly in manufacturing sectors, where they can be more aptly described as technological public–private innovation networks, or TechPPINs. In such networks, public and private actors collaborate and interact to mobilize complex knowledge that is used to produce technological innovation.

The main objective in this work is to develop a conceptual framework to describe the working mechanism of technological public–private innovation networks that leads to efficient interactions between network members (i.e., public and private actors) and better innovation outputs. But, before proposing such framework, we briefly present an overview of the concepts of innovations networks that are intensively discussed in the lit-

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

erature, because they help to define the structures of public–private innovation networks and the factors that may lead to the efficient exchange of knowledge between network actors.

The second part of this article discusses the evolution of the public–private innovation network concept from public–private partnerships, to innovation networks and systems, and then to technological public–private innovation networks. In the third section, we develop a conceptual framework to understand the mechanism driving technological public–private innovation networks. A final section offers conclusions.

The Conceptual Evolution of Public–Private Innovation Networks

Public–private innovation networks have their roots in the well-known concept of public–private partnerships, or PPPs. Both concepts share a similar structure in terms of the key relationship between public and private actors.

A public–private partnership is defined as a form of cooperative venture between public and private firms (Kanakoudis et al., 2007; Moskalyk, 2008) or a contractual agreement between a public agency (e.g., federal, state, or local) and a for-profit corporation (e.g., a national council) or a new way to design, build, finance, and manage (operate) (DBFO) public building and infrastructure (Carassus, 2005). Public–private partnerships depend on public and private actors cooperating with each other to overcome budget constraints, share risk, and deliver a more cost-effective public product.

A public–private partnership is a production-oriented network: production is the main purpose of the partnership. Public institutions resort to the private sector to reduce production costs and because, in most cases, the private sector is more efficient than the public sector. Thus, innovation is not at the core of public–private partnerships, although it might emerge as a by-product of the main activity for which a production-oriented public–private partnership was set up (Gallouj et al., 2013).

The evolution from public–private partnerships to innovation networks and public–private innovation networks reveals a shift from a perspective focused on cost to a knowledge-based perspective based on evolutionary economics. The mobilization of complementary knowledge and technologies is the main purpose of innovation networks, which emphasizes cognitive and technological objectives. In this view, Pellegrin and colleagues (2010) observe that the interactions between actors in innovation networks change from being commercial-, financial-, and production-oriented in nature to "cover a wide spectrum that goes far beyond market relations and contractual relations of cooperation".

An innovation network consists of several actors collaborating in a social, dynamic, and economic environment. This arrangement leads to "intensive communication and collaboration between different actors, private firms, and other organizations such as universities, innovation centers, educational and financing institutions, standard setting bodies, industry associations, and government agencies" (Toedtling & Trippl, 2005), which assures the diffusion and production of innovation output.

The major motivations for the emergence of innovation networks are rapid globalization, convergence of consumer preferences, high competition for limited scientific resources (Tushman, 2004), intensive and permanent changes in technologies, and rapid developments in information and communication technologies (ICTs). All these factors have led to technological and structural deficiencies in many innovative firms and institutions, and thus local connections are becoming insufficient to solely provide the resources and competences that innovative firms might need to offset high costs and keep pace with new technologies. This trend has led to a reduction in the sustainability of the innovation processes and to major limitations on innovation in the absence of global connections to obtain knowledge and information from the surrounding environment. Therefore, organizations must enlarge their boundaries to access a wide range of corporate expertise and technological fields (Cantwell & Santangelo, 2006; Castells, 1996), and to implement new changes to their innovation processes, taking them from a traditional to a more system-centred approach.

Substantial debate about innovation networks can be found in the literature, at theoretical (e.g., Callon, 1991; Pyka & Scharnhorst, 2009), empirical (e.g., Becker & Dietz, 2004; Morrar et al., 2013), and methodological (e.g., Pyka & Schön, 2009; Sundbo, 2010) levels. The innovation network is an application of the non-linear or open model of innovation, and it represents a sustainable way of accessing the external knowledge and technological resources needed to produce innovations in today's environment. In other words, innovation net-

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

works "provide timely access to knowledge and resources that are otherwise unavailable" (Powell et al., 1996).

The evolution of the innovation network concept is "often shadowed by the recent evolution of the innovation systems concept" (Pellegrin et al., 2010), which is recognized as a broader perspective or concept that includes many of the ideas contained in other interactive innovation concepts such as, networks, clusters development blocks, complexes, innovation milieu, complex products and systems, competence blocs (Manly, 2002). The concept of innovation systems has been frequently discussed in the literature (e.g., Edquist, 1997; Lundvall, 1988, 1992; Nelson, 1993). Edquist (1997) defined a system of innovation as "all important economic, social, political, organizational, and other factors that influence the development, diffusion, and use of innovations". In contrast, Nelson (1993) defined a national innovation system as "a set of institutions whose interactions determine the innovative performance of national firms".

The discussion of innovation networks in the literature mainly highlights the role of the private sector as the main constituent element. In other words, innovation networks may be (and often are) primarily *private–private* partnerships. In some cases, in basic research networks, innovation networks may also take the form of *public–public* partnerships (Gallouj et al., 2013). But, the analysis of innovation in a particular system might require interaction or collaboration between both public and private actors (e.g., industry, government, and academia) in the production of innovation (Manley, 2002). Edquist and McKelvey (2000) highlight that the public actors are presented in the realms of public innovation policy to support and enhance innovation activities. For example, Buesa and colleagues (2006) indicate that a regional innovation system includes both public and private actors in one network and a specific area to adopt and produce new knowledge.

Thus, it is important to shed light on public–private innovation networks as an important type of innovation network, and a main source of knowledge and technological competences. The need for public–private innovation networks arises due to the increasing demand for complex networks that involve complex knowledge, sophisticated innovation practices, and the production of technological innovation and in which universities and public research centres play an important role in producing the needed knowledge and R&D. In other words, a significant part of the complex knowledge is obtained through universities, research centres, and R&D institutions, which are defined in many countries as public bodies. In this view, *technological* public–private innovation networks, or TechPPINs, re-formalize the innovation networks to highlight the roles of both public and private organizations in the innovation process, and create new channels for knowledge that mainly flows through the public actors.

Many applications of technological public–private innovation networks can be found in the literature. For example, in Germany, Musiolik and Markard (2010) discussed the traditional public–private innovation networks formed between the fuel cell industry and federal governments to speed up the technology development and market formation for fuel cells. Markard and Truffer (2008) used the technological system of innovation to show the importance of collaboration between public and private agents in the generation, diffusion, and utilization of different modes of technologies and products. The EMC innovation network (tinyurl.com/pyozbke) is also a prominent example, where research and advanced technology groups across EMC, universities, and RSA laboratories collaborate to discover and explore technologies that will shape the information infrastructure of the future. The International Development Innovation Network (IDIN; d-lab.mit.edu/idin) is a global public–private innovation network that includes: universities such as the Massachusetts Institute of Technology, the United States Agency for International Development, the United States Global Development Lab, and firms from the industrial sector. Its aim is to design, develop, and disseminate low-cost technologies to improve the lives of people living in poverty. The Nordic Health Research and Innovation Networks (NRI Networks; nordicnetworks.org) is a public–private innovation network that promotes health research and innovation in the Nordic region. It includes both public and private partners such as university hospitals (e.g., Oslo University Hospital), universities (e.g., Aalborg University and the University of Copenhagen) and other research organizations, the pharmaceutical industry, the medical technical industry, governmental bodies, and patient organizations. The European Workplace Innovation Network (EUWIN; tinyurl.com/oldm6vs) was launched in 2013 to modernize the workplace in order to create better working conditions and increased organizational performance in terms of productivity, innovativeness, and competitiveness. The network enables collaboration between members from enterprise, chambers of commerce, business federations, social partner organizations, public agencies, and research institutions.

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

The literature also contains many empirical studies examining collaboration between public research and private actors (e.g., Cohen et al., 2002; Perkmann & Walsh, 2007; Tether & Tajar, 2008). These studies mainly focus on the actors in the network, the factors determining the collaboration, its purpose and forms, and the evaluation of its performance (Djellal & Gallouj, 2015).

Constructing the Conceptual Framework for Technological Public–Private Innovation Networks

A conceptual framework for technological public–private innovation networks is a theoretical attempt to explain the cooperation and configuration of these networks, and to show the innovation process as an outcome of a collaborative relationship between heterogeneous public and private actors to produce new technological outputs. The theoretical framework is based on a review of literature based on general theory-bridging insights from evolutionary theory, social network theory, lifecycle theory, etc. The framework expresses the dynamic process between the network actors to ensure efficient interaction that might lead to better innovation output. Empirically, this conceptual framework can be applied to describe the interaction mechanism or the innovation process in actual technological public–private innovation networks.

The conceptual framework is developed from four basic theoretical components or concepts, each of which explains an action or function. First, the framework considers the public–private partnerships for innovation between heterogeneous public and private actors in the process of technology creation and diffusion. Second, the framework considers the dynamic and evolutionary process of the interactions between the network actors (David, 1985; Nelson & Winter, 1973), which is responsible for the network formation, or structure, over time. Third, the decoupling and fragmentation of ties within technological public–private innovation networks are enveloped by social network analysis (Cowan et al., 2004; Messica, 2007; Pyka et al., 2010), which generates knowledge disclosure between network actors and stimulates the interaction and innovation processes. Finally, the framework considers that an innovation network has an evolutionary path or lifecycle growth model (Jovanovic, 1994; Klepper, 1996, 1997; Pyka et al., 2010; Weber, 2009). In each stage of the lifecycle, new interactions are re-arranged to construct the network structure over time.

The public actor role in technological public–private innovation networks

In a public–private network, as opposed to a private–private network, the presence of public actors as key participants in the innovation process adds new complexity to the interaction process in the innovation network. Therefore, it is important to know how the relationships or interactions between the public and private actors are developed in the production and diffusion of technological innovation.

In technological public–private innovation networks, public actors are mainly involved in providing technical resources for technological innovation. Therefore, universities, public research centres, and R&D institutions are key public participants, because of their ability to provide complex knowledge and technological capabilities. Nevertheless, the public role changes from one public–private network to another, depending on the complexity of the network, the power-sharing arrangements between the public and private actors, and their relative influence on the innovation.

Public actors can also provide non-R&D knowledge such as organizational and institutional competences (Manly, 2002). A public actor might work as an intermediate organization that provides institutional arrangements required for managing conflicts, regulating relations (i.e., cooperating), and improving the coordination mechanism between network actors. These institutional competences include new rules, routines, approaches, legal and government policies, new types of intervention tools, the design of political initiatives that foster learning and knowledge-exchange processes, and supporting functions that ensure the cross-flows of knowledge and information between other network actors.

A social network analysis of technological public–private innovation networks

Social interaction is a key process in the functioning of technological public–private innovation networks. The decoupling and fragmentation of ties (i.e., interactions) between network actors are simultaneously combined with the development of a social network (Agapitova, 2003), which means that technological innovation in public–private innovation networks is produced using social capital. In this view, the technical and economic factors alone are not sufficient to explain social interactions process in technological public–private innovation networks; a socio-economic framework is important to incorporate both technological and social dimensions of the network interaction processes.

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

Generally, social capital in the networks enhances the collective learning between heterogeneous actors and impacts the exchange behaviour (Granovetter, 1985; Uzzi, 1997), which also applies to technological public–private innovation networks. In a causal mechanism related to innovation, the social proximity in the innovation network has an impact on knowledge spillovers (Coulon, 2005).

Social capital also has an important role in forging relationships, first-stage performance, and maintaining the cooperation between network actors in the long run. It is necessary to recognize the social dimension to tradeoff the deficiency when using economic dimensions to describe social entities, mainly using physical artifacts and the corresponding R&D to describe the different lifecycle stages of technological public–private innovation networks (Pyka et al., 2010).

Social network analysis is one of the most prominent techniques used to incorporate social capital in the analysis of networks (Salavisa, 2009), to describe the shape the evolution of innovation in innovation networks, and to determine the position receptivity or popularity of network actors (Wasserman & Faust, 1994). It has been employed by many researchers in the study of innovation networks. For example, Messica (2007), in a static analysis of innovation networks in the high-technology sector used social network analysis metrics, including the clustering coefficient, the extent of the network, and connectivity, to provide a taxonomy for innovation networks. He classified innovation networks into five categories: ring, mesh, star, fully connected, and line. In a dynamic analysis of innovation networks, Cowan, Jonard, and Özman (2004) used a set of social network analysis metrics including local order (or cliquishness), path lengths, and density. They found that knowledge creation through an emerging network was the cornerstone of the innovation process. Watts (2003) used the distance between nodes to estimate the effect of network structure and the behaviour of actors. Pyka and colleagues (2010) classified social network analysis measures into two groups. The first group includes actor-related measures: degree centrality, closeness centrality, and betweenness centrality. The second group includes network-related measures to describe the structure of the whole network: density, connectivity, distance, degree distribution, and clustering.

Consequently, public–private innovation networks can be seen as social vehicles that provide the social structure for enabling the interactions between the cognitive components of the network and that facilitate the flow or exchange of knowledge and information along the network lifecycle.

The dynamic aspect of technological public–private innovation networks

The dynamic of a network refers to the state of the network in one period determining its state in subsequent periods. Therefore, the initial form of the network has a fundamental role in the evolution of the network at later stages. It determines its final structure. The dynamic of a network should match between two network specificities: i) the enormous complexity of the interaction patterns and ii) the different incentives and information that determine the behaviour and preferences of network actors (Schweitzer et al., 2009)

In technological public–private innovation networks, the innovation process not only depends on the characteristics of the network members, but also on the interactions between them. Meanwhile, the interaction processes between network actors are dynamic (evolutionary processes) (Arechavala-Vargas et al., 2009) and are associated with ties decoupling and fragmentation processes (i.e., the entry of new actors and the exit of others) . In this view, it is important to describe or explain innovation in technological public–private innovation networks in the spirit of evolutionary theory (Nelson & Winter, 1973), and path dependence theories (David, 1985), which describe the networks' dynamic processes. The dynamic process of an innovation network induces knowledge accumulation and learning overtime (Garcia-Pont & Nohria, 2002; Gulati, 1999; Powell et al., 1996), and allow access to new technologies that promote the production of innovation. It also leads to different structures with different roles over time.

Lifecycle growth model of technological public–private innovation networks

Away from the traditional view of public–private partnerships, which focus on the interaction between public and private actors in a static way, it is important to discuss the question of the public–private relationship in technological public–private innovation networks dynamically, by focusing on the lifecycle of networks (Gallouj et al., 2013).

In the literature, there are many models or approaches that describe the dynamic of the network. Li (2005) proposed a socio-cognitive model for newly developed products, which illustrates the dynamic of interaction between technological platform/hard architecture of knowledge and communities/soft architecture of knowledge that lead to open innovative and new products.

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

Podolny, Stuart, and Hannan (1996) used the concept of niches in evolutionary theory and applied it to technological networks, giving rise to the notion of technological network niches. Weber (2009) proposed a theoretical model that explains the network lifecycle using chaos theory and cybernetics for public–private networks.

The network lifecycle growth model is the most well-known theoretical concept employed to describe the growth of networks (Jovanovic, 1994; Klepper, 1996, 1997; Pyka et al., 2010; Weber, 2009). This model consists of three main stages: i) prototype industry; ii) commercialization and entrepreneurial; iii) and consolidation and firm growth.

Gallouj, Rubalcaba, and Windrum (2013) describes the lifecycle model for public–private innovation networks, which is divided into three main stages: i) the proto-industry (crystallization) stage, ii) the commercialization and entrepreneurial stage, and iii) the consolidation and firm growth stage. Each stage of the network lifecycle requires different knowledge bases, resources, actors, demands, and policies. Different modes of interaction between network actors are also expected in each stage; in other words, the exchanged knowledge to produce output "X" will certainly be different from that of producing output "Y".

Two important points should be considered when applying lifecycle growth model to technological public–private innovation networks. First, the social dimension, which requires the introduction of "a socio-economic approach" that consists of both economic measures (relative performance) and relevant social indicators (Cowan, 2004; Koenig et al., 2007; Pyka et al., 2010). Second, in some cases, it is difficult to follow entire stages of a network lifecycle. This difficulty might be explained by the disappearance of the network before the decline stage or the start of a new cycle within the same network (Tushman & Anderson, 1996). In other cases, the network may follow more than one evolutionary path (Weber, 2009).

A conceptual framework for technological public–private innovation networks

Finally, we collect or summarize the previous theories in a conceptual framework that could present a clear mechanism for the interaction process between network actors that might lead to better innovation performance. This framework shows how an efficient collaboration or interaction between public and private actors is happening dynamically along the network product lifecycle, reinforced by social capital so as to have better innovation output and performance.

Within the framework (Figure 1), the innovation process proceeds as follows: the public and private actors communicate and interact between each other, where complex knowledge and technologies are exchanged between them in a collaborative environment and supported by the social capital, to produce better technological innovation output. The complementarities between actors' knowledge and technological resources are crucial for successful and efficient interaction processes. The interaction processes and the production of innovation output are dynamically evolving along the network lifecycle. In each stage of the network lifecycle, the nature of the interaction processes and innovation activities are different (e.g., the mode of innovation in the first stage of network formation is different from that at the growth or maturity stage), determined by the type of actors, the dimensions of social network analysis and the mode of knowledge and technologies that are exchanged among network actors.

Following the innovation network lifecycle developed by Gallouj, Rubalcaba, and Windrum (2013), described earlier, we expect that the role of network actors (private and public) change from one stage to another depending on the nature of required knowledge and technologies and the degree of involvement of each actors. For example, in the crystallization stage, the role of public actors represented by universities and public research centres is the most important among the other members for the initiation of innovation networks, no demand is articulated yet in this stage, and the participation of private organizations is not high. The dynamic process of the technological public–private innovation networks allows for the transition from one stage to another along the network lifecycle (e.g., from crystallization, passing commercialization, to the consolidation and firm growth phase) and shows how the competences and preferences of one actor co-evolve over time with the competences and preferences of the other network actors supported by a feedback mechanism. Network actors either reinforce each other to produce and diffuse new technological resources or, conversely, hamper each other. Social network analysis indicators are important to explain how innovation network safeguards continue the process of knowledge and technologies flowing within the network, therefore they also change from one stage to another along the network lifecycle.

Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

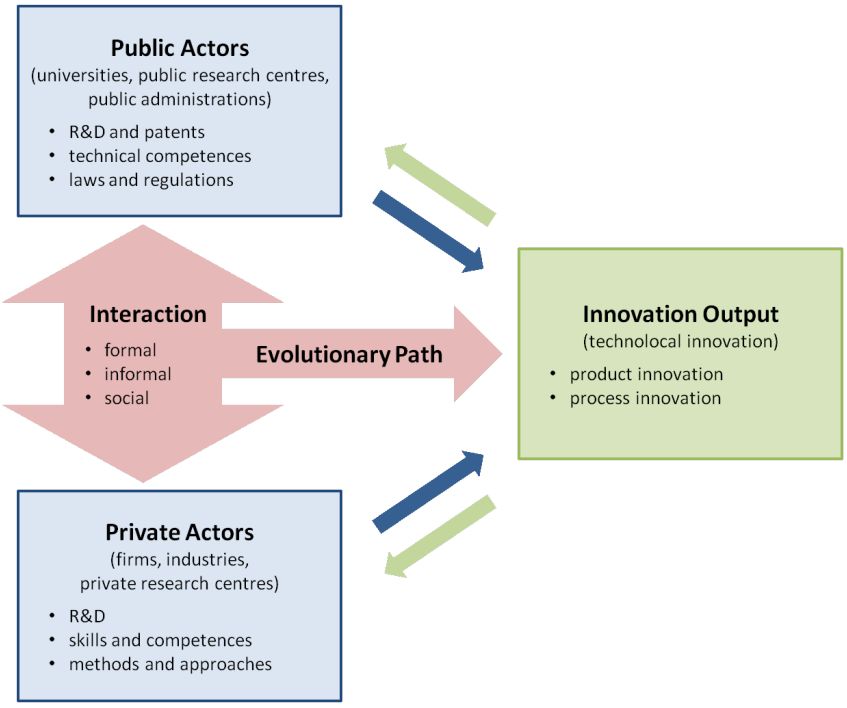

Figure 1. A conceptual framework for technological public–private innovation networks

Conclusion

In this article, we have developed a conceptual framework to account for technological public–private innovation networks. This framework accounts for the cooperation between public and private actors in a complex, dynamic, social, and interactive network structure that might lead to efficient interaction processes between network actors and might lead to better innovation outputs. In such a framework, innovation output is produced through dynamic interaction processes between the public and private actors along the network lifecycle. In each stage, various interactions occur and different modes and various quantities of knowledge and technological resources are exchanged, reinforced by the existence of social capital. The combination of the product lifecycle model and social network analysis allows us to analyze the structure of technological public–private innovation networks at each stage of the lifecycle and to reveal important information about how the roles of public and private actors are manifesting.

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Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

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Technological Public–Private Innovation Networks: A Conceptual Framework

Rabeh Morrar

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Citation: Morrar, R. 2015. Technological Public–Private Innovation Networks: A Conceptual Framework Describing Their Structure and Mechanism of Interaction. *Technology Innovation Management Review,* 5(8): 25–33. http://timreview.ca/article/920

Keywords: networks, innovation networks, technological public–private innovation networks, TechPPINs, public–private partnership, conceptual framework, network lifecycle, social network analysis

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies and Their Impact on Poverty Alleviation

Hina Shah and Punit Saurabh

> *"If by strength is meant moral power, then woman is immeasurably man's superior."*
>
> Mahatma Gandhi (1869–1948)
> Leader of the Indian independence movement

The need to improve the status of women and the promotion of women's roles in development are no longer seen merely as issues of human rights or social justice. Investments in women are now widely recognized as crucial to achieving sustainable development. Economic analyses now perceive that low levels of education and training, poor health and nutritional status, and limited access to resources not only repress women's quality of life but limit productivity and hinder economic efficiency and growth. Therefore, the development of opportunities for women is imperative, not only for reasons of equity but also because it makes economic sense and is "good development practice". The article describes the status and background of women in South Asia and highlights the need to create women entrepreneurs for poverty alleviation. Although some women do start micro-level businesses to support themselves and their families, the contribution is minor and many of these businesses are unlikely to grow or are not viable over the long term. Thus, this article focuses on women entrepreneurship development programs in light of the challenges and regional variations facing women entrepreneurs in South Asia and identifies nine areas where such programs can be strengthened. Their successful replication and implementation, in India specifically and South Asia generally, is discussed for an international audience to raise awareness of the challenges women and support institutions have faced in achieving success in fostering women entrepreneurship. It is hoped that this narration of the Indian and South Asian experience will assist in its replication in other developing nations.

Introduction

Across the globe, women entrepreneurship development has acquired significant attention in recent years. The next decade could see increased effort in this direction due to objectives of regional balance and employment. Reasons for the increased interest in fostering women entrepreneurship include:

1. The acceleration of economic growth requires an increased supply of women entrepreneurs (Shah, 2012). Women entrepreneurs, when successful, act as a changemaker in their families and society and inspire others to become self reliant and take up entrepreneurship. Their success helps families, society, and local and regional economies by contributing to the growth of the nation. As cited by VanderBrug (2013), women in emerging markets plough back 90 cents of every additional dollar of income into "human resources", which includes their families' education, health, and nutrition (compared to 30–40% for men), thereby helping their families, communities, and nations. However, this supply has not been rapid, consistent, or sufficiently widespread among various strata of the population, especially among women in poverty and hence the need to promote women entrepreneurship development (ICECD, 1999).

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

2. Past and recent experiences of failures of microbusinesses and non-performance of enterprises have underscored the importance of entrepreneurial competence. Half of the world's population cannot be ignored: women can make an important contribution to business creation (Shah, 2012). Although the percentage of women entrepreneurs in the South Asian region is less than 13% (Singer et al., 2014), they own 37% of all businesses the world over and generate $29–36 billion USD through businesses in South Asian region alone (VanderBrug, 2013)

3. For the success of microenterprises, especially in manufacturing, development efforts have come to depend more on the person behind the project, the women owner/manager and the entrepreneur. Failures in making significant breakthrough in rural and underdeveloped areas have generally been due to a lack of local women entrepreneurs (Shah, 2013).Thus, there is a need to locate, encourage, and develop women entrepreneurs for accelerated rural development, regional spread of industrial activities, and non-farming employment generation to alleviate poverty.

However, despite attempts to bring out the entrepreneurial capabilities of women, there are substantial challenges that inhibit their capabilities to perform, including:

- lack of access to support networks,
- issues relating to gender or cultural acceptance (Singer et al., 2014)
- lack of basic education
- lack of technical skills and knowledge about business
- lack of market knowledge (making them vulnerable to exploitation by market forces)

Across the globe, the most chronic problems identified by researchers are women's lack of confidence and difficulties in acquiring entrepreneurial skills (Shah, 1996). Another area of concern is the issue of economic sustainability of women-led microenterprises. In the specific context of enhancing the economic position of women, microenterprises refer to income-generating projects that women undertake to advance their own and their families' economic well-being. The enterprises can be classified into two categories: on farm and off-farm (ICECD, 1999). For rural women living in poverty in India, the situation is even grimmer, because it is often exacerbated by exploitation. Because of family responsibilities, certain social customs, values, and practices in some societies, and because of male dominance, women in India often lack exposure to the outside world. Forced to work within a restricted ecosystem, aspiring women entrepreneurs living in rural areas become dependent on middlemen and other agencies, especially if markets are beyond their reach (Shah,1996).

They are also denied equitable access to information, technical know-how, extension programs, training, marketing assistance, credit, and a general opening up of their horizon. As described in a survey report published by the United Nations Conference on Trade and Development (UNCTAD, 2013), "...due to their difficulty in dealing with the life puzzle originated by the need of taking care of family and business at the same time, women entrepreneurs are considered to have relatively lesser experience in terms of handling external business contacts for innovation. However, such difficulties have also enabled women to embrace the opportunities provided by information and communications technologies (ICTs) to create marketing channels, collect customer information and improve efficiencies in their business processes". For example, as per a report to the United Nations Economic and Social Commission for Asia and the Pacific (Shah, 2013), 81% of women in India use ICT technologies for communication and networking purposes.

We shall now discuss the challenges and regional variations, to what extent women entrepreneurship development programs are effective and successful, and how they can be further improved to alleviate poverty in developing nations. The article draws upon the literature on women entrepreneurship in India but also on the authors' experience in entrepreneurship and in developing programs to foster women entrepreneurship in India while highlighting the South Asian context.

Women Entrepreneurship in Rural South Asia: Challenges and Regional Variations

South Asia is a vast region with great cultural and economic variations between and within the countries of Bangladesh, India, Pakistan, and Sri Lanka. The same is true with respect to issues relating to women, although it can be said that all women in the region have suffered from the common problem of male dominance, including women in rural areas.

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

But, issues pertaining to microenterprises and entrepreneurship development for rural women in the region have become varied because of variations in economic development between countries. Women from developing countries in the region participate in income-generating projects out of economic necessity and desperation originating from chronic poverty leading to issues of survival for them and their family. They are forced to take the risk, become courageous, to come out of their homes and participate in such income-generating projects. Once they are out of their home and start conducting their own business, the fear of interacting with outsiders appears to recede, along with pressure from family members.

The level of national economic advancement, however, is not the only factor generating variations in the nature and problems with women entrepreneurship in the region. Other factors such as political ideology and cultural barriers have also caused variations. Social attitudes still characterize entrepreneurship as a male endeavour, and discrimination discourages many women from entering private business (Shah, 2013).

Although regional variations should caution us against making general statements about microenterprises and entrepreneur development for women in the region, they should not distract us from discerning common problems faced by the majority of them. These women operate in adverse conditions and overcoming these adversities is of utmost importance as it strikes at the very root of their livelihood. For them, and indeed other disadvantaged women like them, the problems besetting their microenterprises should be given greater attention.

The subsections below examine four of the key factors we identify as obstacles in setting up a microenterprise in India specifically and South Asia generally: i) production technologies and skills; ii) financial resources; iii) marketing and product development; and iv) management.

Production technologies and skills

For women living in poverty, one main concern is access to production technologies that are appropriate for their restrictive conditions, but they are seldom made available (Shah, 1996). For on-farm enterprises, appropriate production technologies typically include: those that relate to subsistence food crops and small animals; those that take into account women's labour availability and workload as a constraint; and those that consider women's preferences as the intended users of the technologies. Thus, the development of such production technologies would recognize, for instance, the role that women play in weeding and thinning of crops and the increasingly limited time that farm women have for such activities on account of increasing male migration. Similar gender-sensitivity is required in developing production technologies for off-farm enterprises. For example, an improved weaving device in India that required eight hours operation a day to make it profitable was rejected by women who only had two to four hours to spare for this particular activity (Carr, 1991).

However, it must be noted that production technologies that save time and lighten workloads may have the counter-productive impact of displacing rural women altogether. For example, technological attempts to improve productivity in poultry have effectively removed women from poultry businesses in many countries as men were better able to profit from the innovation (Acharya, 1981). This means that care must be taken in innovating with production technologies so that improved techniques really mean improved benefits for women.

In many other countries, improved production technologies are badly needed but on the condition that they make do with local raw materials, local producers' skills, existing market demands, traditional distribution and marketing channels, local institutions and their functioning, and local system of production. Finally, although a number of institutions have been carrying out numerous studies into appropriate and improved technologies for microenterprises, such as for food processing and packaging, fibre extraction, fodder production, firewood production, mulberry cultivation as well as reeling and spinning of silk, strategic gaps in applied research remain in the region.

Financial resources

Entrepreneurs need money to buy the inputs for their production. If they do not have this capital, then they can borrow from financial institutions that lend out money by using their assets as collateral. Thus, financial resources are not a major obstacle for entrepreneurs that have the required collateral and guarantors. However, few women living in poverty in South Asia are able to overcome this obstacle. In India, Pakistan, Bangladesh, and Sri Lanka, for example, many rural and agricultural women face substantial problems accessing credit for the purpose of starting up or running

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

day-to-day businesses. (Llanto et al., 1991; Bourqia et al., 1991). In India, and its other South Asian counterparts, accessing banking support for starting a business is considered as one of the most difficult tasks, as per the narrative given by entrepreneurs to ICECD. The predicament of women entrepreneurs is the result of various constraints posed by several quarters, including the procedures of modern banking and financing and the prevailing social and cultural norms working against the women's interests.

Thus, aspiring women entrepreneurs living in poverty are forced to borrow from usurious middlemen. Fortunately, for some of them, there are informal credit sources, of late, which are especially tailored to suit their needs and constraints. Hence, we hear the success stories of client-friendly credit schemes operated by governmental and non-governmental organizations, such as Friends of Women's World Banking Association and Tambon Vieng Women Group in Thailand; the Grameen Bank and the Bangladesh Rural Advancement Committee; the Production Credit for Rural Women in Nepal; the CYCI scheme of ICECD/Commonwealth; and the Working Women's Forum and the Working Women's Credit Society in India (Llanto et al., 1991). The merits of these lenders lie in the fact that their credits are not subsidized but are based on savings mobilization and market orientation of interest rates, which will guarantee self-reliance and sustainability of the project, and will eventually free women living in poverty from dependence on money lenders and external funding support.

Perhaps the most remarkable of funding sources is the Grameen Bank of Bangladesh (grameen.com). The average income of the bank's almost one million borrowers, 92 percent of whom are women, has increased over 30 per cent – a convincing demonstration that women living in poverty are creditworthy. Another testimony to the effectiveness of the banks' approach is that, when it is replicated in other countries in the region, it proves to be even more successful judging by the percentage of income increment obtained by the borrowers.

Marketing and product development

The marketability of the products produced by microenterprises of the women living in poverty in the region has been a nagging issue. Market forces are dynamic, and consumers may change their tastes and preferences, hence their demand for particular products may change. Producers need to be innovative in their approaches and strategies if they wish to stay in business for long. Unfortunately, a lack of marketing knowledge remains a major constraint for many women entrepreneurs in South Asia. Some of the examples examined by ICECD show that rural women's microenterprises suffer from several marketing weaknesses. But also, they suffer from poor product design, quality control, and packaging. Delivery, distribution, and networking are other areas of weakness. They do not adequately generate a market and promote their products, and they often fail to constantly improve those products to suit a changing marketplace.

In Bangladesh, the Bangladesh Rural Advance Committee (BRAC; brac.net) puts particular emphasis on a market approach to project design wherein none of the marketing activities in the women's microenterprises operate independently of the others. The final step of selling is always tied to product design by market feedback, which may lead to changes in the product. The approach adopted by the International Centre for Entrepreneurship and Career Development (ICECD; icecd.org) in India is to develop these missing marketing skills in women living in poverty and assist in the selection of non-conventional but market-oriented products. Women are provided with rigorous market exposure, they interact with marketing experts, and they learn to conduct test marketing. They are helped during the initial period of 3 to 12 months not by the Centre marketing their products, but by helping them to create a solid base and network. At the ICECD, women entrepreneurs have demonstrated high sensitivity to market changes and have been quick in adjusting to new demands.

Management

Managing an enterprise involves planning, budgeting, organizing, staffing, directing, controlling, innovating, and relating to people. In the case of aspiring women entrepreneurs living in poverty, these functions of enterprise management are often not performed entirely and independently by the women producers themselves. Several factors have led to this situation: illiteracy, low educational levels, poverty, lack of exposure to business, and a lifetime of ideological, social, legal, and psychological subjugation. All of these factors have prevented professional women managers from being nurtured and encouraged.

It is the intervening organizations that help to provide direction as problems and opportunities arise, and to make changes if the women's enterprises are not progressing towards their goals. They have to teach the women that enterprises need to be creative, rather than

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

just adaptive, if they are not to remain static. This assumption of the managerial functions by intervening organizations with regard to the women's microenterprises is not always positively perceived and does not produce the desired results. It relates to the commitment and the availability of personnel and funds from the intervening organizations. Some experiences in the region have demonstrated that support from entrepreneurship development organizations does not ensure sustainability and can be counterproductive in many cases (Shah, 2012). For example, we have observed entrepreneurs who were earlier found to be keen in pursuing a business plan, but had to reform their plan (as per the supporting organization's dictate) to such an extent that they lost the motivation to pursue the changed business plan. In some cases, the entrepreneur's reliance on day-to-day support from assisting organizations lead them to lose their self motivation, which negatively affected the pursuit of their business goals.

Potential for Fostering Women Entrepreneurship

Surplus labour, especially among young people and women living in poverty is a great liability but can become an asset once those with potential are selectively groomed for self-employment and enterprise formation, leading to further job opportunities for others. The socio-economic objectives of decentralizing ownership of businesses cannot be served unless non-traditional sources of entrepreneurship are tapped. The entrepreneurial base will have to be widened by making it possible for all to share opportunities for owning businesses. This goal cannot be achieved by credit and promotional efforts alone, given the socio-cultural impediments facing women in developing nations. Interventions through a women entrepreneurship development strategy for poverty alleviation are needed to bring out women entrepreneurs and nurture and sustain them, through efforts such as training and counselling, developing an appropriate environment, and providing support. Women entrepreneurship development is a human resource development task of the highest order in which the process deals with human motivation, skills, competencies, social and economic risks, and investment of financial and physical resources for a target group, which has been subjugated for centuries. The sensitivity required in handling these tasks in creating, nurturing, and supporting women entrepreneurs from traditional and non-traditional sources has to be recognized by all concerned.

Women entrepreneurship development programs for poverty alleviation combining motivation, training, and counseling, are already well known as an effective tool (Shah, 2013). The major thrust now has to be on what more can be done. Improving the effectiveness of the ongoing efforts, simultaneously widening the programs to cover a wider variety of target groups and regions, and new thrust areas should therefore be given prime focus while analyzing future needs for replication.

Women entrepreneurship development, at the same time, cannot be limited to training. Training is only one way of expanding the entrepreneurial base of a country. Other avenues must also be explored. The environment plays a critical role for all entrepreneurs (trained or untrained and new or existing) for their survival and growth. In the latter part of this article, therefore, some issues and needs to improve the environment to facilitate the emergence of women entrepreneurs, nurture and foster their growth of women entrepreneurs in general are also discussed.

However, there is a no reliable record of who conducts how many women entrepreneurship development programs in a year and, therefore, what is the total output in terms of number of new women entrepreneurs developed and enterprises set up every year in this vast region. Over 1000 organizations are involved in women Entrepreneurship development. In the next section, we will discuss how the impact of such programs and organizations can be evaluated and assessed.

Evaluation and Assessment of Impact

Assuming for the time being that having a large number of organizations to alleviate poverty through women entrepreneurship is an unavoidable phenomenon in many developing countries, the foremost questions that must be answered are: What are the results? Are they satisfactory? Can we do better? Though the ultimate test of women entrepreneurship development programs is not just how many women entrepreneurs set up enterprises, but how many survive and grow over a period of time. The performance of such programs in most countries and by most organizations leaves much to be desired. Without claiming reliability of data in absence of any systematic studies, our experience working with women entrepreneurs in India indicates that well under half of the women living in poverty who are trained in entrepreneurship programs ultimately set up enterprises.

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

Not only there is substantial wastage of resources and efforts, when so many trainees do not set up enterprises, but the credibility of the whole effort is further affected, thereby discouraging new-corners and the support institutions, particularly those who share the cost of these programs. However, there can be no fixed percentage as a minimum satisfactory level. Although it is recognized that, in rural areas or when dealing with under-privileged communities, rural poor, or tribal groups or women, initial efforts yielding, say 30 per cent results is not bad, we must raise our expectations in terms of results for all other target groups. This need to raise expectations is especially important when poor results are due to poor training and support.

Long-Term Funding and Labour Issues

At the international level, a consciousness must be created that ambitious unrealistic quantitative targets, if not achieved through proper quality of selection and training and implementation support, would create more frustrations among the high percentage of non-starters, and may discourage many others from taking up entrepreneurial careers.

The focus on women entrepreneurship development programs must be on commercial manufacturing or service activities that amount to setting up a microenterprise of some sort that has potential for further employment generation. This effort must be distinct from information-giving awareness programs, which are essentially promotional efforts and do not directly develop women entrepreneurs. Any debate on developing women entrepreneurship, therefore, must focus on what it takes to develop an entrepreneur, who, in turn, must set up a business. Without this clarity, this sensitive qualitative human resource development task is bound to become diluted and become a mechanical training exercise.

1. Based on the learning acquired from our experiences, we believe that impact-generating women entrepreneurship development programs require expert handling from conceptualization to implementation , which must be carried out in a composite and continuous manner to cover: Sound promotional efforts before the program to encourage potential women entrepreneurs to come forward

2. Proper selection (not everyone is capable of being an entrepreneur)

3. The establishment of links between the woman entrepreneur and a viable business opportunity and support in developing it. This integrated process of developing women entrepreneurs requires a competent trainer-motivator possessing: i) certain personality traits and behavioural qualities to act as leaders, counsellors, and motivators; and ii) adequate knowledge about business, sources of information, and support system and skills to perceive the potential in aspiring women entrepreneurs, opportunities in the region, and capabilities to mould potential women entrepreneurs into owners of enterprises into a systematic business plan

4. Developing motivational and entrepreneurial capabilities

5. Developing managerial capabilities in women entrepreneurs

6. Providing necessary information, counseling, and follow-up support throughout the creation phase of the business and beyond.

Strengthening Women Entrepreneurship Development Programs

If women entrepreneurship development programs are important for human resource development for poverty alleviation by enlarging the number of enterprises, there should be a stronger commitment to the programs and more systematic planning. In India, such programs have been made an integral part of industrial development (through the government's Five-Year Plan) because they serve a variety of important objectives for self employment, development of rural and under-developed areas, and benefiting less privileged groups, including women. This section identifies nine areas where women entrepreneurship development programs can be strengthened.

1. Enhancing institutional support

It is important that women entrepreneurship development programs to foster the creation of manufacturing or service microenterprises be supported by more than just the government; support from key banking and financial institutions and other assistance agencies is required by women entrepreneurs. If possible, program budgets could be shared by these agencies. Sharing costs would help improve the efficiency of these organizations in helping women entrepreneurs. Both the

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

trainers and women entrepreneurs would also become more confident in their effort because of the involvement of these support organizations in their endeavour.

2. Building up the support infrastructure
At an organizational level, it is essential that women entrepreneurship development is taken up by more specialized organizations that have a stronger commitment to this activity. Unfortunately, countries in South Asia, such as Vietnam, Bangladesh, and Sri Lanka, along with India, still have a long way to go in setting up specialized entrepreneurship centres dedicated to women. A different culture is required to promote, motivate and develop sustainable infrastructure for fostering women entrepreneurship. A band of dedicated trainer-motivators is key to this program. A great deal of improvisation, innovation, and learning from experience is called for. The organization and the trainers must be doing training and development work continuously rather than an existing officer "spared" for a program here and there. The scale of operations within any country will have to be fairly large, because the entrepreneurial potential among women living in poverty is high even in the most underdeveloped regions.

The specialized organizations that provide women entrepreneurship development programs, therefore, will have to be set up with adequate human and financial resources. In India, with a basic initiative from ICECD and support from a number of financial organizations in many other countries such as Sri Lanka, Pakistan, Bangladesh, Nepal, Philippines, and Thailand, these organizations have so far helped women launch many enterprises, but there is much work left to be done. Women from Indonesia, Sri Lanka, Malaysia, and India have highlighted the need for capacity-building support; they have also identified the need for basic skills in bookkeeping and accounting as well as assistance in removing other such constraints that prevent them from taking advantage of available opportunities (Shah, 2013).

3. Enlarging the cadre of trainer-motivators
It is a strategic weakness in women entrepreneurship development efforts that a large number of programs focus only on technical training or only provide credit for women living in poverty. Sometimes, organizations provide marketing for the women entrepreneurs and make them only wage-earning beneficiaries. There is a need to select and groom new trainer-motivators to provide a broad spectrum of support to help women entrepreneurs start and grow microenterprises throughout South Asia.

4. Identifying opportunities
One of the more urgent needs is to identify a variety of tiny, micro-, and small-scale project opportunities that the women entrepreneurs can take up. This is necessitated by the fact that new women entrepreneurs in the region – due to their limited educational background, vision, and capabilities – need the help of support organizations to identify opportunities. Many of these entrepreneurs have very limited resources, and support agencies intend to firm up the opportunity without wasting their precious resources accumulated for the venture. Adequate advance work needs to be undertaken in identifying prospective projects to suit local entrepreneurial needs in terms of investment, technology, skills, resources, and markets. This function has to be undertaken in a decentralized fashion location-wise. Most of the existing organizations are ill equipped for this work and will need training in project identification strategies.

5. Training and counselling
Given the supply of competent trainers, inventory of project possibilities, and untapped potential of aspiring women entrepreneurs, the development tasks then require counselling and teaching material in local languages. This is where a major gap exists. Training manuals, training materials, audio-visual aids, etc. have been developed by many organizations, especially by ICECD over last 27 years. It should be the task of country-level trainers to translate available training material to suit the requirement of the region. Adequate funding will have to be ensured for this work.

6. Identifying candidates for entrepreneurship
A major thrust of women entrepreneurship in most Asian countries is for under-privileged groups of women. However, it has to be recognized that not everyone can be turned into an entrepreneur. Programs can identify aspiring entrepreneurs with good potential for success and provide them with training, counselling, and support to set up businesses. Others may be better suited to employment opportunities. Therefore, our major thrust should be to accelerate the number of tiny, micro, and small enterprises, and therefore, supply a first generation of women entrepreneurs from rural or urban areas, who in turn, will generate jobs for others. Given their socio-economic constraints, it is often the rural woman living in poverty who seek employment or self-employment. This trend needs further encouragement through appropriate changes in the institutional financial assistance schemes, which at present, are often not liberal enough to recognize a woman as a genuine self-dependent business owner.

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

7. Supporting women entrepreneurs through to operation
So far, the focus of women entrepreneurship development programs has been on individual development. At ICECD, we emphasize the importance of selection, followed by behavioural inputs to develop motivation in the person to take up entrepreneurship and succeed as an entrepreneur. What began as an experiment in a State of Gujarat in India in the late 1970s has now become a national and international movement. The spread of women entrepreneurship development programs is a result of recognition and financial support provided by the governments, financial institutions, central banks, and the development corporations and banks, bilateral, and multilateral donors, and many others. This movement also has been professionally and qualitatively strengthened by the setting up of resource organizations such as ICECD and many other organizations in the South Asia region. Box 1 illustrates an example of an entrepreneur who initiated the process of entrepreneurship with the support of ICECD.

8. Fostering an entrepreneurial culture and environment
To ensure a future supply of entrepreneurs, an entrepreneurial culture and spirit should be encouraged in families from early childhood. Further, the overall environment, especially the policies, schemes of assistance, and their implementation, must induce and encourage women entrepreneurship. In spite of the first recommendation reflecting a long-term goal, the second one offers scope for early actions for the benefit of all women entrepreneurs, whether trained or untrained, whether starting tiny, micro, or small enterprises. Once we create the first generation of women entrepreneurs, the business environment will change and the entre-

Box 1. The case of Anita Amitbhai Hudda, woman entrepreneur in electrical goods manufacturing

Anita Amitbhai Hudda is a 47-year-old woman living in the city of Ahmedabad in India's westernmost state of Gujarat. She has been a creative person from the very beginning and graduated from her local college. She married a local businessman, Amitbhai Hudda, but was otherwise undecided on what to do after finishing her education. In 2009, her husband insisted that she utilize her creative skills for some gainful purpose. Having found that she was not able to receive any technical support from her family, friends, or neighbours, she finally came across the Aga Khan Foundation (akdn.org/akf), a globally reputable social entrepreneurship organization working for the economic and social welfare of men and women from local communities. The Aga Khan Foundation helped her to take up the Entrepreneurship Development Program at ICECD with full sponsorship support. At ICECD, she initiated the learning process of creating a business plan. This process helped her tremendously with idea generation and opportunity recognition. She finally zeroed in on the opportunity of manufacturing innovative iron pipes for electrical lighting and other electrical equipment. Such products were sometimes hard to find, and even if they were available, they were not available cheaply. Moreover, the existing products available in the local market lacked both quality and innovation.

She initially invested a small sum of INR 100,000 to set up a manufacturing plant within the periphery of her house with additional support from her husband. Gradually, she was able to hire two people to assist her with the manufacturing process, which was very complex and demanded domain skills. Because Anita had interned at one of the local manufacturing units, she utilized this knowledge to great advantage. She gradually introduced a product mix, diversifying from manufacturing electrical pipes to manufacturing different types of rubber clamps and fasteners. Her unit presently manufactures fan down rods and street lighting equipment along with the associated electrical fittings. The demand for electrical fittings is high because of the booming housing and infrastructure sector in Ahmedabad. These items are readily available through the electrical goods wholesale and retail markets.

Today, after give years in business, Anita is a successful businessperson with a turnover of INR 5 million. She has 700 dedicated customers in Ahmedabad, and her sole proprietorship has flourished from a small garage to an expanded manufacturing unit. She supplies to well-known companies through IndiaMart, with orders flowing from all over India. She has employed 12 men along with two women in her manufacturing unit, in addition to contributions from her son and her husband. Her success has inspired her son to pursue commerce education, and he too is looking forward to become an entrepreneur like his parents.

Anita has plans to establish her own factory at the Changodher industrial area, and she credits her success to her family members and supporting organizations such as ICECD and the Aga Khan Foundation.

preneurial thinking will exist in families, and a new generation of children will begin thinking along these lines. This pattern was evident in the case of entrepreneur Smita Jani, who became a successful technology entrepreneur manufacturing multimeters and inspired her son to open his own enterprise in mobile phone repair (Shah, 2013).

The present strategy of developing women entrepreneurs focuses on uneducated rural and urban women who are living in poverty. The time has come for an effort to inculcate a spirit of enterprise, self-dependence, creativity, and high goals among women in developing nations. Because the social fabric changes slowly, interventions are needed, and the first step is an educational policy. Entrepreneurship should be made part and parcel of the education curriculum.

9. The entrepreneurial environment
Despite a large number of organizations to promote and assist women entrepreneurs and a variety of schemes to attract and facilitate them, the environment is still not sufficiently conducive for women entrepreneurs to actually set up enterprises. Often, an entrepreneur has to go through a complex set of procedures and formalities to start a business, which not only create irritations and delays but frustrate her efforts until she is exhausted. An urgent need, therefore, is to simplify procedures and formalities. Part of the problem is one of attitudes, which are built on regulatory roles rather than developmental roles. All these agencies need to be gender sensitive. Part of the answer lies in developing the need to inculcate an extension approach among operational level offices of all assistance agencies. ICECD's recent efforts, therefore, in conducting extension motivation and entrepreneurial orientation and gender sensitization programs for such officers, is consistent with the broad view that good training can help create better and more dedicated trainers who can bring the desired change through entrepreneurship.

Conclusion

In conclusion, it can be said that, although some successful strategies have been evolved, much still has to be done in the effort to alleviate poverty by developing women entrepreneurs in the countries of the South Asia region. The overall impression one sets is that, in the countries of the region, the survival and sustainability of the women's microenterprises depend overwhelmingly on external supports, all the way from generating appropriate production technologies and skills to financial support and access to credit to marketing and enterprise management. In one sense, these factors hold true for all enterprises, whether micro, small, medium, or large. However, the capabilities of the women living in poverty are the crucial factors. Those who are capable and possess the skills and knowledge have fought through the non-conducive environment and have progressed.

No one should dispute the imperative of effective external support systems without which the poverty-stricken and much disadvantaged women could not even survive. But, after managing to survive, where do the women's microenterprises go to and what directions should they take? What is empowerment for the women if it means permanent dependency on others? Real empowerment can come only through capacity building and independence. These are vital questions that should be asked as we reflect on the future of women's microenterprises in the region, especially where it concerns aspiring women entrepreneurs who are currently living in poverty. Women entrepreneurship development programs, when successfully implemented, help us provide the answers. On the whole, women entrepreneurship development programs help enterprises to graduate from being basic income-generating projects to sustainable businesses at preservation levels, and then gradually to enterprises that are focused on growth and raise expectations for economic development and the alleviation of poverty in developing nations.

About the Authors

Hina Shah has been an entrepreneur since 1978 in the field of plastic packaging. She is currently Director of the International Centre for Entrepreneurship and Career Development (ICECD) in Ahmedabad, India. In 1986, she has transformed her own entrepreneurial experience into this developmental initiative, which has facilitated thousands of disadvantaged youth, with a special focus on women, in becoming entrepreneurs in India and around the world.

Punit Saurabh is senior faculty member at International Centre for Entrepreneurship and Career Development (ICECD) in Ahmedabad, India. His research interests include innovation management and entrepreneurship development, and he has varied experience in product funding and commercialization. His interests also include international affairs, healthcare, and women entrepreneurship.

Women Entrepreneurs in Developing Nations: Growth and Replication Strategies

Hina Shah and Punit Saurabh

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Citation: Shah, H., & Saurabh, P. 2015. Women Entrepreneurs in Developing Nations: Growth and Replication Strategies and Their Impact on Poverty Alleviation. *Technology Innovation Management Review*, 5(8): 34–43. http://timreview.ca/article/921

Keywords: women entrepreneurship, women entrepreneurs, poverty alleviation, developing nations, women entrepreneurship development programs

TIM Lecture Series

Communicating Strategy: How Drawing Can Create Better Engagement

Stephen Cummings

> *"Something changes when someone picks up a pen. When they start to draw, and rub things out, and put arrows between things. There is energy in the act of drawing, and it's that energy we want to try to promote and capture. People will become more engaged with strategy if you draw it with them."*
>
> Stephen Cummings
> Professor of Strategic Management
> Victoria University of Wellington

Overview

The TIM Lecture Series is hosted by the Technology Innovation Management (TIM; timprogram.ca) program at Carleton University in Ottawa, Canada. The lectures provide a forum to promote the transfer of knowledge between university research to technology company executives and entrepreneurs as well as research and development personnel. Readers are encouraged to share related insights or provide feedback on the presentation or the TIM Lecture Series, including recommendations of future speakers.

The fourth TIM lecture of 2015 was held at Carleton University on August 13th, and was presented by Stephen Cummings, Professor of Strategic Management at Victoria University of Wellington in New Zealand. Cummings presented some of his recent research into strategic management and creativity, emphasizing why leading creative organizations (or organizations that seek to be creative) should map their strategy graphically.

Summary

Over three years and seven countries, Cummings and his colleagues tested over 1000 subjects' responses to the same strategy presented in different modes. The experiment confirmed what some strategy mavericks, from Mintzberg to Kaplan and Norton to Kim and Marbourgne, have suggested: that strategy presented visually can be far more effective than strategy conveyed in paragraphs or bullets of text. But, it also revealed some surprising reasons for this finding, and it offers some interesting insights into why, despite the effectiveness of visual presentation, the vast majority of organizations do not represent their strategies graphically.

The lecture first examined how to develop strategy in creative teams. Then, Cummings illustrated how drawing can create better engagement when creating and communicating strategies. Finally, he identified common reasons why companies are not using drawing, despite its benefits.

Leadership in creative organizations

With his colleague, Chris Bilton, Reader in the Centre for Cultural Policy Studies at the University of Warwick, United Kingdom, Cummings found almost no difference in the mechanisms of creativity between organizations in what are typically considered "creative domains" (e.g., a theatre company) versus non-creative domains (Bilton & Cummings, 2010). As he summarized, "creativity does not depend on working in an obviously creative domain." Any organization can be creative; however, what does make a key difference between creative organizations and non-creative organizations is leadership.

Communicating Strategy: How Drawing Can Create Better Engagement

Stephen Cummings

Creative organizations can be characterized by a different mode of leadership that is neither top-down nor bottom-up. This different approach to fostering creativity involves "leading from the middle" by recognizing and encouraging creativity. Bilton and Cummings (2010) identified four main approaches used by leaders in creative organizations to do this:

1. *Promoting:* creating an environment where creativity is allowed to flourish and achievements are recognized. Leaders promote and encourage creative ideas.

2. *Linking:* sponsoring ideas and creating connections.

3. *Sussing:* discovering the essential aspects of the business. Asking "What sort of company do we want to be?" and defining what is meant by winning.

4. *Mapping:* determining how to get from the present situation to the desired future, or outlining "How will we win?".

Building strategy

Based on this research, Cummings and his colleague Duncan Angwin, Professor of Strategy at Lancaster University in the United Kingdom, have recently published the book *Strategy Builder: How to Create and Communicate More Effective Strategies* (Cummings & Angwin, 2015), which shows how to creatively combine the best strategy frameworks to orient and animate strategy discussion and development around what winning looks like and how an organization will win. In researching the book, along with its associated app, StrategyBlocks Builder (strategicplan.com), Cummings and Angwin found that strategy is a rich field for frameworks (e.g., value chains, Seven Ss, BCG matrix, generic strategy matrix, 5 forces of industry, industry lifecycle), many of which are well known and frequently used. Indeed, the field lends itself to graphical representation, and yet current practice is to communicate strategy with text. The book – and the second part of Cummings' TIM Lecture – set out to encourage strategy builders to increase engagement by creating and communicating strategy by drawing it.

Cummings suggested that the more useful definition of strategy in this context comes from the economist Robert M. Grant, who simply stated that "strategy is about winning". How winning is defined depends on the individual, whether it means making money, making the world a better place, improving efficiency, or some other goal, but if this is what strategy is aimed at, Cummings stated, "the key question is how do we get there... how do we win?". People enjoy thinking strategically – people enjoy figuring out how they are going to win and how they are going to get there – they find it intellectually stimulating. However, developing and communicating strategy using traditional approaches has become overly complicated, boring, and disengaging.

Cummings argues that a key to greater engagement, and therefore to more effective strategies, lies in embracing the act of drawing when creating and communicating strategy. He identified several reasons why drawing strategy should be helpful in these efforts:

1. Drawing can be a more accessible and engaging group activity than writing.

2. It is easier to remember pictures and drawings.

3. Drawing helps us see and show relationships.

4. Drawings are easier to combine, change and re-engineer than text, especially in a group setting. Hence, they are good for prototyping ideas, seeing things from the user's perspective and otherwise helpful in encouraging "design thinking".

Examples based on SWOT

To demonstrate how drawing can be more effective, Cummings demonstrated a better way to use the SWOT (strengths, weaknesses, opportunities, and threats) framework using real-life examples.

In various surveys, SWOT is consistently ranked as the most popular strategy tool used in business, but is also usually ranked as the least satisfactory – primarily because it does not yield actionable activities or objectives. Typically, there is too much time spent on strengths and weaknesses first, when opportunities and threats are likely to be the more urgent considerations. By the time the discussion turns to opportunities and threats, the list of strengths is already too long to be useful and the group has run out of energy. And, in any event, strengths and weaknesses can only be properly assessed in light of the opportunities and threats under consideration.

Given that SWOT is well-established tool (it is more than 50 years old) and its popularity endures, Cummings and Angwin asked why it was not delivering greater value. They argue that the problem does not lie

Communicating Strategy: How Drawing Can Create Better Engagement

Stephen Cummings

in the tool itself, but rather in how it is used: as a text-generation tool rather than a drawing tool. A more graphical perspective shows that SWOT can be a useful strategy tool, provided it leverages the benefits of drawing.

In *Strategy Builder,* Cummings and Angwin show how SWOT can be a way of drawing upon and summarizing insights from other frameworks and developing strategy in a matrix of Os and Ts versus Ss and Ws instead of just a set of four lists.

The idea is to seek interesting areas where collisions of ideas will happen. As shown in Figure 1, the general approach is to start by identifying the important aspects that are external to the organization: opportunities and threats. Next, the key internal aspects – strengths and weaknesses – are examined in light of the opportunities and threats identified earlier. Then, the body of the matrix is completed by collisions or interactions between the four aspects of SWOT. From this step, actionable objectives can be determined that, when achieved, will help the organization realize its overall vision of what winning looks like.

To demonstrate this approach, Cummings worked through several examples, including a case study of a local company in Ottawa. Prior to the lecture, Cummings met with Colin Pritchard, COO of InteractiveStudios (interactivestudios.ca), to develop their strategy using this graphical "collision" approach to develop a "strategy on a page". InteractiveStudios is a startup founded by students at Carleton University and based in the Carleton-Led Accelerator, which is administered by the TIM program (timprogram.ca). The company creates digital directories for shopping malls, hospitals, and other large sites suited to interactive methods of wayfinding and analysis.

Figure 2 shows a version of the collision matrix drawn by Cummings during the TIM Lecture to illustrate the application of the strategy on a page idea applied to this case, which had been first developed in the earlier meeting.

In recreating the drawing for the audience, Cummings noted that there is a difference between drawing (the verb), and the value that can be derived in developing strategy by doing it, versus drawing (the noun), and the value it holds as a means to communicate strategy. Here, the act of drawing facilitated the creation of strategy for InteractiveStudios, but the output – the drawing itself, including its informality and shorthand notations – would not be easy to interpret by those who

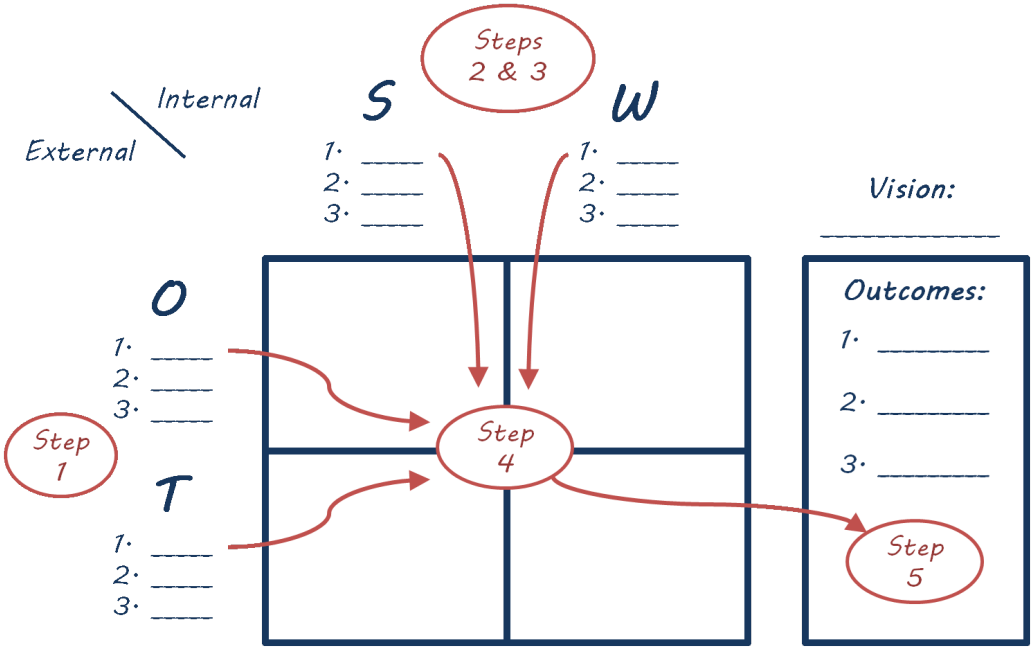

Figure 1. A sketch of the "strategy on a page" approach to graphical SWOT analysis by Cummings and Angwin (2015). Opportunities and threats are identified first, followed by strengths and weaknesses, which are then collided to identify actionable outcomes.

Communicating Strategy: How Drawing Can Create Better Engagement

Stephen Cummings

were not part of the exercise or did not witness it being created in real-time. Thus, a final version of the strategy can and should be further refined, for example by a graphic designer, and may need to be tailored to particular audiences (e.g., staff, investors, other stakeholders), with different styles, emphases, and degrees of detail. On this point, Cummings emphasized that:

"The real benefit is not in the drawings *themselves – although they do add value – but in actually* drawing *it yourself: actually scratching on a piece of paper or on a whiteboard, drawing things, rubbing them out, having someone say 'That's wrong - I wouldn't have drawn it that way' and then debating it with them... that's where the real value is. This way, strategy becomes a social exercise - something that we share, something that we create together. If people work together to develop strategy – how to win and how to get there – then they become more engaged, and they want to see it succeed."*

Key findings

In the final part of the lecture, Cummings examined reasons why organizations rarely use drawing to develop and communicate their strategy, despite the benefits discussed above. These ideas were based on the research experiment conducted with his colleagues Duncan Angwin and Urs Daellenbach (Cummings et al., 2014) described earlier. They researched the effectiveness of communicating the same strategy in different ways across over 1000 subject in 8 different countries: bullet points, paragraphs of text, or pictures). The key findings of this research are as follows:

1. People recall strategy presented in text only about half as well as in pictures, and bullet points offer almost no advantage over paragraphs. This difference is universal, occurring in all countries and ages. If a subject receives the strategy as text and then chooses to recall it as a picture, they will recall nearly as much as those who received picture and recalled using a picture. Those who received a picture and tried to remember it using text had recall nearly as poor as those who received text and recalled using text. This indicates that there are likely kinetic benefits of drawing strategy. Also, the recall benefits of bullet points versus paragraphs are slight.

2. Subjects who receive the strategy as a picture and record it as a picture are much more likely to see how the parts of the strategy fit together, or are integrated. Those who receive the strategy as a paragraph can see more integration than those who see it as bullet points.

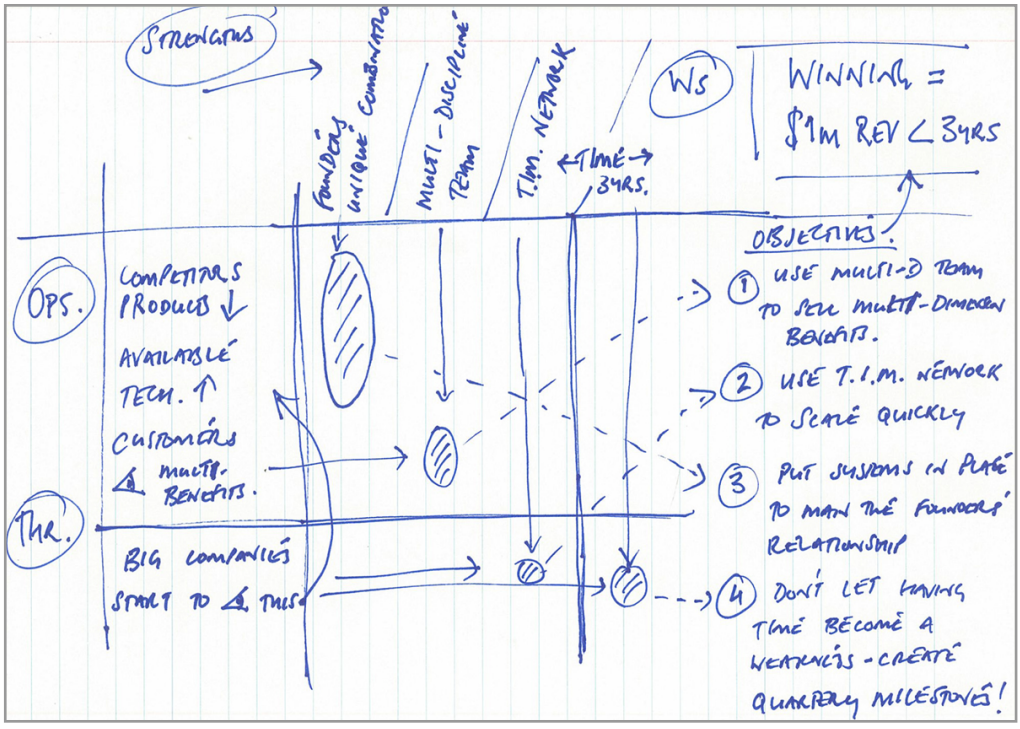

Figure 2. Graphical SWOT analysis of InteractiveStudies, as drawn by Stephen Cummings during his TIM Lecture on August 13th, 2015

Communicating Strategy: How Drawing Can Create Better Engagement

Stephen Cummings

3. Despite much higher levels of recall, people who receive and recall a strategy as a picture do not have any greater degree of confidence to discuss the strategy with others than those who receive and recall it as bullet points. In fact, those who received bullet points have far greater confidence per element they can recall. Unfortunately, confidence is highest among those who recall the least about the strategy!

4. A large percentage of subjects who received the strategy as a picture chose to recorded it as text. A very small percentage switched text into a picture. This suggests that people are far more comfortable thinking in text than pictures.

The first two findings sit in contrast to paragraphs of text being the dominant form of communicating strategy today (and the larger perceived advantage of bullets over paragraphs). The last two findings provide some important caveats to drawing strategy which are picked up in the key conclusions of the lecture, listed below.

Conclusions

Finally, at the end of the lecture, the audience was asked to co-create a list of key takeaways, or lessons learned, from the presentation. These were:

1. If you want your team to be creative and engaged you need a different mode of leadership than the traditional top-down approach. You need to get to "the middle" and promote and link the ideas of others, suss out what winning looks like. and map out how people can work together toward that goal.

2. Drawing is a powerful way to develop and communicate mapping a strategy that focusses people on "what winning looks like" and "how do we win". Strategy already has a range of useful frameworks and tools – we just need to utilize these in a more hands-on and graphical way.

3. Many people are still more comfortable and confident communicating in text. Hence, drawing is not a universal panacea and it should not replace text: the context is important and refinements (including multi-modal approaches that incorporate bullet point summaries) may be useful, to greater and lesser degrees, to suit different audiences.

About the Speaker

Stephen Cummings is Professor of Strategy and ICMCI Academic Fellow at Victoria Business School, Victoria University of Wellington, New Zealand. He has published on strategy, creativity, and management history in a range of journals including the *Academy of Management Learning and Education Journal, Academy of Management Perspectives, Human Relations, Long Range Planning,* and *Organization Studies*. He has also written, co-written and edited a number of books promoting creative approaches to strategy development. These include *Recreating Strategy* (2002), *Images of Strategy* (2003), *Creative Strategy* (2010), *The Handbook of Management and Creativity* (2014), and *Strategy Builder: How to Create and Communicate More Effective Strategies* (2015).

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This report was written by Chris McPhee and Stephen Cummings.

Citation: Cummings, S. 2015. TIM Lecture Series – Communicating Strategy: How Drawing Can Create Better Engagement. *Technology Innovation Management Review*, 5(8): 44–48. http://timreview.ca/article/922

Keywords: strategy, strategic management, communicating, drawing, illustrations, visual communication, frameworks, SWOT

Author Guidelines

These guidelines should assist in the process of translating your expertise into a focused article that adds to the knowledge resources available through the *Technology Innovation Management Review*. Prior to writing an article, we recommend that you contact the Editor to discuss your article topic, the author guidelines, upcoming editorial themes, and the submission process: timreview.ca/contact

Topic

Start by asking yourself:

- Does my research or experience provide any new insights or perspectives?
- Do I often find myself having to explain this topic when I meet people as they are unaware of its relevance?
- Do I believe that I could have saved myself time, money, and frustration if someone had explained to me the issues surrounding this topic?
- Am I constantly correcting misconceptions regarding this topic?
- Am I considered to be an expert in this field? For example, do I present my research or experience at conferences?

If your answer is "yes" to any of these questions, your topic is likely of interest to readers of the TIM Review.

When writing your article, keep the following points in mind:

- Emphasize the practical application of your insights or research.
- Thoroughly examine the topic; don't leave the reader wishing for more.
- Know your central theme and stick to it.
- Demonstrate your depth of understanding for the topic, and that you have considered its benefits, possible outcomes, and applicability.
- Write in a formal, analytical style. Third-person voice is recommended; first-person voice may also be acceptable depending on the perspective of your article.

Format

1. Use an article template: .doc .odt
2. Indicate if your submission has been previously published elsewhere. This is to ensure that we don't infringe upon another publisher's copyright policy.
3. Do not send articles shorter than 1500 words or longer than 3000 words.
4. Begin with a thought-provoking quotation that matches the spirit of the article. Research the source of your quotation in order to provide proper attribution.
5. Include a 2-3 paragraph abstract that provides the key messages you will be presenting in the article.
6. Provide a 2-3 paragraph conclusion that summarizes the article's main points and leaves the reader with the most important messages.
7. Include a 75-150 word biography.
8. List the references at the end of the article.
9. If there are any texts that would be of particular interest to readers, include their full title and URL in a "Recommended Reading" section.
10. Include 5 keywords for the article's metadata to assist search engines in finding your article.
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