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Abstract

The shift from a stand-alone innovation approach to networked innovation can pose several challenges to a Small Business with reference to the resources, competencies and capabilities (R&C&C) leveraged on to achieve competitive advantage. The present study analyzes this issue, proposing a resource-based fuzzy framework to investigate the effect of such change on a Mobile Small Business’ resource endowment. The focus at the empirical level is on the rise of the mobile application store model as a substitute to the original mobile portal model, carrying out multiple case studies and applying fuzzy set theory on an extensive set of significant companies. The original framework first focuses on identifying and categorizing Mobile SMEs’ R&C&C through the case studies; these R&C&C are then turned into fuzzy numbers, and their core status is assessed by means of linguistic scales. The framework’s results show how some traditionally fundamental resources in the Operators-centric paradigm (e.g. portal access; responsiveness to Operators’ requests) fell to a non-core status, while others, largely related to open innovation, external partnerships orchestration and resilience, are gradually becoming key to create and consolidate competitive advantage.

Keywords: Small-Medium Enterprises; Innovation; Resource-based View; Mobile Industry.
1 Introduction

A swift change in the innovation paradigm in place can shake the very foundations of a market’s structural and strategic environment. A growing literature (Ahuja 2000; Kale, Singh, and Perlmutter, 2000; Gulati, Nohria and Zaheer, 2000; BarNir and Smith, 2002; McGovern, 2006; Street and Cameron, 2007; Nieto and Santamaría, 2010) reports a cross-markets tendency to increase a firm’s social embeddedness (Granovetter, 1985) by forming networks of alliances aimed at pursuing joint innovation. The widespread phenomena represents a vivid example of the shift from a closed, stand-alone and independent approach towards product and process innovation, to a more open, cooperative and interdependent model.

When a paradigm shift of such magnitude takes place, scholars and practitioners raise questions concerning the actual achievability and sustainability of competitive advantage within the newly emerging innovation paradigm. This research question becomes particularly significant when referring to Small Businesses and Small-Medium Enterprises (SMEs), increasingly involved in such innovation networks (Premaratne, 2001; Freel, 2003; Rogers, 2004; Hewitt-Dundas, 2006; Street and Cameron, 2007; Gnyawali and Park, 2009). In fact, the justification for SMEs’ strategic decision to partake in a given network should lie in the increased probability to discover new sources for survival from competition and success, ultimately synthesized by an above-average performance (e.g., see Bougrain and Haudeville, 2002; Street and Cameron, 2007; Liao, Kickul and Ma, 2009).

In relation to this argument, a widely accepted standpoint in Strategic Management holds that creating a sustainable advantage requires to complementary leverage on unique resources that potential competitors cannot easily replicate or leapfrog (Hamel and Prahalad, 1994), or to develop the capability to pursue continuous innovation (Teece, Pisano and Shuen, 1997; Hamel and Valikangas, 2003). First or early entry alone cannot become the source of a true advantage, unless firms relate it to its existing core assets and industry dynamics (Christensen, 1997; Porter, 2001; Suarez and Lanzolla, 2005). These considerations reveal the importance to assess the resources, competencies and capabilities endowment a firm relies on to compete when confronting the strategic challenges an innovation paradigm change determines, also analysing how the emerging technology and business dynamics influence and potentially reshape such endowment.

An intriguing case of shift from a closed, piecemeal innovation approach to networked innovation is currently taking place: such phenomenon involves the Mobile Content market, that is, the market for mobile non-voice digital content and services. Here, the traditional Operator-centred Mobile Portal model, where Operators owned the unique outlet for content and service offer, strictly controlling the innovative content and services published in it through closed strategies, is challenged by an emerging alternative system. Initially introduced by a newcomer, Apple Inc., but quickly adopted by incumbent players (included, paradoxically, the Operators themselves), the so-called Mobile Application Store model sees different players concuring in creating a new hybrid Mobile-Web interface for application publishing: the ecosystem is managed jointly with application developers, through an open approach. Such case provides a fresh and delimited context for theory building on innovation paradigm change’s effects on the resource endowment of a Small Business.

This paper aims at addressing the issue of how the introduction of a networked innovation paradigm, alternative to the dominant one (characterized by a closed approach toward Research & Development) and enabled by innovative technologies and systems (i.e., the Mobile Application Store), affects the Mobile SMEs’ core resources, competencies and capabilities (R&C&C) grounding competitive advantage. Taking the perspective of the Mobile Small Businesses participating to the innovation network – i.e. the Mobile Content & Service Providers (MCSPs) and the Mobile Technology Providers (MTPs) – linked to the value network’s focal firms (Gulati, Nohria and Zaheer, 2000), that is, the Mobile Network Operators (MNOs), the study addresses the issue of shift in the core status of
resources (the dependent variables) determined by a variation in the approach towards innovation (the independent variable).

Taking stock of a literature review on Strategic Management and Innovation theories linking Strategic Planning with the Resource-based View, the Dynamic Capabilities Approach and Network Innovation for SMEs to ground and test the definition of core R&C&C, and leveraging on multiple case studies and Fuzzy Set Theory as an empirical research method, the paper pictures and compares the traditional Mobile Portal model and the Application Store anomaly.

2 Literature review on small Businesses, networked innovation and the role of resources, competencies and capabilities

The present study grounds the original contribution abridging the following major literature streams: the Resource-Based View (RBV); the Dynamic Capabilities Approach (DCA); and the Networked Innovation theories. The table below provides a brief outlook on the existing knowledge this study leverage on to provide its original contribution. As a whole, the cross-research stream literature review allows to identify a number of literature gaps: the present research aims at closing such shortcomings through the provisioning of a dynamic framework for Small Business R&C&C assessment and management in volatile and discontinuous environments affecting the innovation paradigm conditions.

Table 1. Literature streams abridged and literature gaps addressed

<table>
<thead>
<tr>
<th>Literature streams abridged and existing contributions leveraged on for the study</th>
<th>Literature gaps addressed</th>
</tr>
</thead>
</table>
| RBV and DCA | • Definition of resources, competencies and capabilities (e.g. Barney, 1991; Hamel an Prahalad, 1994; Teece et al., 1997)  
• Test for core resource assessment (e.g. Collis, Montgomery, 1995) | • Adoption of Fuzzy Set methods for integrated and dynamic R&C&C (RBV + DCA) assessment  
• Relationship between innovation paradigm shift and SMEs resources endowment |
| Small Business and Networked Innovation | • Small Businesses resources endowment (e.g. Rothwell and Dodgson, 1994; BarNir and Smith, 2002; Mariz-Pérez and García-Álvarez, 2009)  
• Small Business and innovation through networks of alliances (e.g. Premaratne, 2001; Street and Cameron, 2007) | • Identification of a SME’s core R&C&C in a networked innovation environment  
• Innovation paradigm shift assessment in a noteworthy industry (i.e. Mobile Telecommunications) |

3 Goals and methodology

As mentioned above, the research aims at providing a reference framework for Small Businesses resource management and assessment after a discontinuity affecting the innovation paradigm takes place. While multiple case studies focus on gathering qualitative information and data, the study bases the assessment of R&C&C status on the fuzzy set theory.
3.1 Multiple case studies for empirical data gathering

Data gathering leverages on case studies (Yin, 2003): qualitative research methodology is particularly suitable for reaching the research objectives, which aim at understanding the complex phenomenon of the innovation paradigm shift within a given industry – that is, the Mobile Telecommunications Industry – characterized by a high level of dynamicity and competitive turbulence, and at thus building new theory, or extending existing theories, on such context (Walsham, 1995).

To accomplish the previously identified research propositions, from March to September, 2011, thirty in-depth case studies based on ninety semi-structured interviews were performed. The cases analyse companies classifiable as follows: Mobile Network Operators – 4 companies; Device Manufacturers – 3 companies; Mobile Content & Service Providers – 6 companies; Mobile Technology Providers – 5 companies; Web Companies– 3 companies; Media Companies – 4 companies; Mobile Platform & Operating System vendors – 2 companies; Software Developers – 3 companies.

Existing literature provides a variety of definitions for Small Business, alternatively based on: structural characteristics such as the number of employees or number of functional divisions (Vinten 1999), performance characteristics such as amount of annual revenues or depth of the product line (Yap, Thong, and Raman 1994), or both (Evans 1999; Dana 1998); industry type (Human and Provan 1996), or company age (Feindt, Jeffcoate, and Chappell 2002); or resource endowment (Alvarez and Barney 2002). The companies in the sample definable as SMEs are: 5 MCSPs, 4 MTPs, 3 Media Companies; 3 Software Developers.

Though the study selected the Mobile Small Businesses as the reference actors, the choice of including other players and competitors – among which, large companies like MNOs, Internet & Media Companies, and Device Manufacturers – in the sample allowed to obtain a multi-perspective view on the phenomena under scrutiny, which, taking into consideration the rise of a networked innovation paradigm, is multi-actor by definition; integrating the Mobile SMEs’ perspective with that of larger Mobile incumbents and focal firms could provide a valuable insight on the SMEs’ R&C&C transformation.

The semi-structured nature of the interviews made possible to start from some key issues identified through the literature – such as the Mobile companies’ resources portfolio as described by previous literature –, but also to let any innovative issue emerge from the open discussion. Informants were first asked to describe the current, traditional innovation model in place within the Mobile Content market from their own perspective, stressing its pros and cons (with questions like “What actor has the predominant role?”,”How is the system of relationships arranged?”, and so on); later, they were requested to identify the main perceived and expected changes in the strategic landscape brought in by the introduction of Application Stores as an alternative distribution model, leading to the rise of a networked innovation configuration. They were also asked to address how such changes could affect the actors’ strategies – with specific focus on resources, competencies and capabilities endowment –, identifying the main opportunities and risks implied.

3.2 Fuzzy Set Theory for empirical data analysis

Numerous company problems with non-probabilistic uncertainty essentially due to the vague and ambiguous definition of the relevant variables apply the fuzzy set theory (Zimmermann, 1991). Zimmer (1983, pp.86-88), for instance, asserts that humans are unsuccessful in making quantitative predictions, whereas they are more efficient in qualitative predictions. For present purposes, the study considers a typical assessment model, that is the fuzzy linguistic model descending from fuzzy set theory, and uses the model to evaluate the core status of an R&C&C starting from qualitative information and data deriving from the case studies.

The concept of linguistic variables constitutes the basis for fuzzy linguistic modes. A linguistic variable is a variable for which the values are not numbers, but words or phrases of a natural language
A linguistic variable represents the group of linguistic values, as each value is a fuzzy set.

Selecting from the numerous fuzzy linguistic models available (cf. e.g., Liang, and Wang, 1993), to assess the core status of each R&C&C, the study applies these steps:

1. definition of the importance weightings of the assessment criteria; the linguistic variable $\Omega$ measures the importance of the criteria;
2. attribution of the values for each assessment criterion in the alternatives analyzed; the linguistic variable $\Psi$ indicates attribution;
3. calculation of the overall assessment of each individual alternative, weighting the attribution values to the respective importance criteria and ranking the alternatives. The weighted average operator (Zadeh, 1965) can serve to calculate the overall value of the assessment

$$\Lambda_i = (1/m) \odot \left[ (A_{i1} \odot W_{i1}) \odot (A_{i2} \odot W_{i2}) \odot (A_{i3} \odot W_{i3}) \odot \ldots \odot (A_{im} \odot W_{im}) \right]$$

where:
- $\Lambda_i$ is a fuzzy number representing the overall value the assessment of the $i$th alternative permits to obtain;
- $W_j$ is the importance of the $j$th criterion;
- $A_{ij}$ is the linguistic value the model associates to the $i$th alternative for the $j$th criterion, and $m$ is the number of assessment criteria;
- “$\ominus, \odot$” are the fuzzy algebraic addition and multiplication operators.

The formula proposed by Zadeh (1965) enables to calculate the membership function of $\Lambda$. The formula gives a fuzzy number with a non-triangular membership function, that can be approximated to a fuzzy triangle whose vertices coincide with the weighted average of the assessments of the various alternatives (Zadeh, 1965):

$$\Lambda_i = (Y_i, Q_i, Z_i).$$

$\Lambda_i$ then allows to rank the alternatives under scrutiny. The literature proposes different ranking methods, among which the study selects the most common and appropriate (Karkowski, and Evans, 1986), calculating the center of gravity of the fuzzy number $\Lambda_i$ as:

$$X_{Gi} = \frac{\int_{S_i} x dS_i}{\int_{S_i} dS_i}$$

4 The classification of the case studies-derived core resources, competencies and capabilities

Leveraging on the case studies performed and refining the analysis through the industry-specific literature review carried out, and applying open coding techniques borrowed by Grounded Theory (Glaser and Strauss, 1967), a list of thought-to-be core R&C&C for Mobile SMEs was derived. The list is further divided into three original macro-categories, which took into account the consolidated or emerging nature of each element, as well as its impact on competitive advantage (core or hygienic).

Each category considers both Technology-wise and Businesswise R&C&C, where Technology-wise refers to R&C&C which are related to the firms’ technological assets, while Businesswise are those R&C&C linked to the firm endowment in terms of marketing assets (e.g. brand, customer loyalty), relational agreements, financial structure or to strategic approaches.
Traditional core R&C&C groups those resources that were considered to be core within the Mobile Portal paradigm, before the innovation paradigm discontinuity took place.

- **Service Creation**: ability to create original digital content, services and applications to deliver to the end customer – either to the consumer or, potentially, to the business market. Such competence encompasses the R&D ability to develop creative knowledge and to concretize it in a digital software, through leveraging on proper IT tools.

- **Gatekeeping Systems Access (Mobile Portal)**: access to the major traditional distribution channel for Mobile value added services offer, that is, the MNO-controlled Mobile Portal.

- **Interconnection to Charging-Billing-Accounting (CBA) Systems**: asset represented by the technological interconnection to the MNO-controlled transaction enabling systems.

- **Brand reputation**: possession of a company brand with high customer awareness.

- **Relationship with MNOs**: the ability of establishing business relationships with the Mobile Value Network traditional focal firms, that is, the Operators, is key for Mobile Small Businesses success or even survival in the market.

- **Responsiveness**: the competence related to the managerial orientation towards quickly interpreting MNOs’ indications concerning value added services offer, and subsequently responding to their innovation needs (Mobile Small Business had often to configure themselves as “trusted followers”, often taking on the unpleasant role of “Operators’ sidekick” as an interviewed manager ironically put it).

Traditional hygienic R&C&C groups those resources that were considered a strategic necessity – that is, essential to compete but not grounding a sustainable competitive advantage – rather than core within the Mobile Portal paradigm, before the paradigm discontinuity took place.

- **Relationship with Software Developers**: network of alliances and agreements with third party value added services and applications developers.

- **Relationship with Mobile Platform and Operating System vendors**: network of alliances and agreements with third party MP and OS providers.

- **Financial solidity**: capacity to efficiently gather and allocate financial resources.

- **Internal Resource Gathering**: managerial ability to collect, integrate and align diverse internal assets – e.g. knowledge, creative manpower, IT systems, contractual arrangements, cash flows – coming from different organizational entities and sources, and to direct them towards the achievement of the company’s market goal, that is, the creation of original content, services and applications.

Emerging core R&C&C groups those resources that were considered to be rising as core within the innovative Mobile Application Store model, after the paradigm discontinuity took place.

- **Gatekeeping systems Access (Mobile Application Store)**: access to the emerging distribution paradigm of the emerging value added services and applications offer, that is, the Application Stores.

- **Self-Publishing Platforms**: provisioning of systems and tools – e.g. open Application Program Interfaces, open and easy to use SDK, pricing control, analysis and reporting – to enable third party’s independent management of value added service offer.

- **Relationship with Device Manufacturers**: network of alliances and agreements with third party DM.

- **External innovation orchestration**: ability to breed and lead internal and third party innovation within an ecosystem of separate though interacting entities (Chesbrough and Appleyard, 2007).
• **Resilience**: capability to continuously anticipate and adapt to business changes, in order to respond to the dynamicity currently characterizing the Mobile industry (D’aveni and Gunther, 1994; Kuo and Yu, 2006; Peppard and Rylander, 2006; Ghezzi, Balocco, and Rangone, 2010).

### 5 The application of the 5 literature-derived tests to the identified R&C&C and assessment of their contribution to competitive advantage

The previous list is an aggregation and elaboration of the empirical results as derived by the case studies: since the purpose of the research is to delineate how the innovation paradigm shift changes the nature of existing R&C&C in order to identify the new Mobile SMEs’ core R&C&C endowment (by demoting previous core resources or promoting hygienic and emerging resources to the core status), each resource or asset listed shall be further analysed through the lenses offered by the synthetic five tests proposed in Collins, Montgomery (Collis and Montgomery, 1995), so as to infer whether the tangible or intangible asset can actually be considered a core element affecting the firm’s strategy. Collins and Montgomery (1995) draw from and bring together previous studies on the field, and propose a holistic and synthetic set of conditions to fulfil so to verify if a resource or competence is core, who. In order to be considered core, a resource or competence shall pass five tests.

1. **Inimitability**: hard to copy, thus limiting competition and generating profitability over time, thanks to physical uniqueness, path dependency, causal ambiguity – that is, the difficulty to both isolate the value creating resource and to reproduce such resource – and economic deterrence – as for overcapacitory, a heavy investment on the resource, paired to a limited market receptiveness, deters competitors from reproducing the resource.

2. **Durability**: slowly depreciating.

3. **Appropriability**: creating value which is easily captured by the firm.

4. **Non-substitutability**: hardly replaceable by a similar, substitutive resource.

5. **Competitive superiority**: relatively superior to other resources possessed by competitors.

The resources are alternatively labelled as core, semi-core or non-core, according to their outcomes of the testing process.

Applying the five tests to each resource coming from the first step allows to achieve such goal. Hence, using the fuzzy set theory the second step of the framework correlates the fifteen R&C&C to the five tests. For each crossing, the framework points out if the given resource passes the test with a strong or weak correlation to the underlying characteristic.

The implementation of the fuzzy model requires the following phases:

1. determine the importance weighting of the five discrete indicators (i.e. the five literature-derived tests) resulting from the analytical model;

2. assess the performance of the R&C&C for each indicator/test;

3. calculate the overall core status of the R&C&C by applying the importance weightings to the assessments

#### 5.1 Phase 1. Determine the importance weighting of the discrete indicators

A fuzzy model measures the relative importance of the different assessment criteria by means of a linguistic variable, using the scale:

\[ S_\alpha \in \{ \text{High, Medium-High, Medium, Medium-Low, Low} \} \]
where (Liang and Wang, 1993): Very Low = (0;0;0,3); Low = (0;0,3;0,5); Medium = (0,2;0,5;0,8); High = (0,5;0,7;1); Very High = (0,7;1;1).

The discrete indicators for the present case are the five tests RBV and DCA propose for assessing the R&C&C core status. The study assigns a fuzzy number to each test, as follows: [I] Inimitability; [D] Durability; [A] Appropriability; [N] Non Substitutability; [C] Competitive Superiority

According to the literature on RBV and DCA (e.g. Collis, and Montgomery, 1995), all five test hold the same validating power and assume equally high importance in assessing the core status of an R&C&C.

Therefore, in determining the importance weighting, the assumption is to assign to all five tests a “Very High = (0,7;1;1)” and equal weighting.

5.2 Phase 1. Assess the performance of the R&C&C for each indicator/test

This phase measures the performance of the R&C&C on each test, through the linguistic variable, being in the case of discrete indicators. The decision-making rules use the following linguistic scale for measurement (Liang, and Wang, 1993): $S_\Psi = VP, P, F, G, VG$, where $VP = $ Very Poor $= (0, 0, 0.2)$, $P = $ Poor $= (0, 0.2, 0.4)$, $F= $ Fair $= (0.3, 0.5, 0.7)$, $G = $ Good $= (0.6, 0.8, 1)$, $VG = $ Very Good $= (0.8, 1, 1)$.

The choice of making this testing process researcher-led and not informant-led stems from the assumption that researchers possess a more holistic and methodologically rigorous view, being capable of basing their judgment on the whole pool of data and information collected through the multiple cases, and on methods and tests drawn from and grounded in existing literature (Yin, 2003).

5.3 Phase 3. Calculate the overall core status of the R&C&C

The study applies the formula from Zadeh (1965) to calculate the overall core status:

$A = \frac{1}{m} \sum \left[ (A_i \otimes W_i) \oplus (A_i \otimes W_i) \oplus \ldots \oplus (A_n \otimes W_n) \right]$  

Operationalizing the theoretical tenets, and considering the linguistic scale $S_\Psi$ in Liang and Wang (1993), a resource is core if the center of gravity of the fuzzy number associated to such a resource is close to the center of gravity of the linguistic value $(0.8, 1, 1)$, which stands for a “Very Good” judgment; a resource in not core if its center of gravity is close to the linguistic value $(0, 0, 0.2)$, implying a “Very Poor” judgment. To take in-between results into fair account, the authors introduce the notion of semi-core to identify resources characterized by a linguistic value centered in $(0.3, 0.5, 0.7)$, which corresponds to a “Fair” judgment.

Figure 1 graphically represents the scale of linguistic values (belonging to $\Psi$) used to assess the R&C&C (Liang, and Wang, 1993).

![Figure 1. Scale of linguistic values belonging to $\Psi$ to assess R&C&C](image)
Figure 2 summarizes the overall static assessment completed on the fifteen R&C&C addressed, evidencing which resources and assets have resisted the wind of change, which emerging elements have actually risen to a core status and which have fallen apart to a non core or competitive hygienic situation.

<table>
<thead>
<tr>
<th>FUZZY NUMBERS</th>
<th>[I]</th>
<th>[D]</th>
<th>[A]</th>
<th>[N]</th>
<th>[C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEIGHTINGS</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>VERY HIGH</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**STATUS**
- Service Creation: 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.56 1.00 1.00 CORE
- Interconnection to C-B-A Systems: 0.8 1.0 1.0 0.8 1.0 1.0 0.6 0.8 1.0 0.8 1.0 1.0 0.50 0.96 1.00 SEMI-CORE
- Gatekeeping System Access (Portal): 0.0 0.2 0.4 0.3 0.5 0.7 0.8 1.0 1.0 0.6 0.8 1.0 0.0 0.0 0.2 0.24 0.60 0.66 NON-CORE
- Brand Reputation: 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.56 1.00 1.00 CORE
- Relationship with MNO: 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.56 1.00 1.00 CORE
- Responsiveness: 0.3 0.5 0.7 0.3 0.5 0.7 0.8 1.0 1.0 0.0 0.2 0.4 0.0 0.2 0.4 0.20 0.54 0.66 NON-CORE
- Relationship with Developers: 0.6 0.8 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.5 1.0 1.0 0.53 0.96 1.00 CORE
- Relationship with MP-OS: 0.8 1.0 1.0 0.6 0.8 1.0 0.6 0.8 1.0 0.8 1.0 1.0 0.6 0.8 1.0 0.48 0.88 1.00 SEMI-CORE
- Internal Resource Gathering: 0.6 0.8 1.0 0.3 0.5 0.7 0.8 1.0 1.0 0.0 0.2 0.4 0.0 0.2 0.4 0.24 0.64 0.70 NON-CORE
- Financial Solidity: 0.0 0.0 0.0 0.3 0.5 0.7 0.6 0.8 1.0 0.0 0.2 0.4 0.3 0.5 0.7 0.24 0.50 0.66 NON-CORE
- Self-publishing Platform: 0.6 0.8 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.6 0.8 1.0 0.6 0.8 1.0 0.48 0.88 1.00 SEMI-CORE
- Gatekeeping System (Store): 0.0 0.0 0.0 0.6 0.8 1.0 0.6 0.8 1.0 0.0 0.0 0.2 0.3 0.5 0.7 0.21 0.46 0.62 NON-CORE
- External Innovation Orchestration: 0.8 1.0 1.0 0.8 1.0 1.0 0.6 0.8 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.53 0.96 1.00 CORE
- Resilience: 0.8 1.0 1.0 0.8 1.0 1.0 0.6 0.8 1.0 0.8 1.0 1.0 0.8 1.0 1.0 0.53 0.96 1.00 CORE

Figure 2. The evaluation of the resources, competencies and capabilities status through the five fuzzy tests.

An example for the calculation of the Network Infrastructure fuzzy number (0.56, 1, 1) appears in Figure 3.

![Figure 3](image)

Figure 3. The graphic representation and evaluation of the fuzzy number for Service Creation (0.56, 1, 1)

6 Discussion and conclusions

A shift in the overall paradigm entangling how innovation is performed as a stand-alone, intra-firm process, or an open, inter-firm network of relationships has deep strategic implications concerning Small Businesses’ core resources endowment. The research findings span from RBV and DCA-specific results to other significant issues relevant to Strategic Management and Networked Innovation Theories as theoretical streams and as practices, with specific reference to Small Business Management.
With reference to the issue of resource management, its importance for strategists as a manner of creating and, most of all, sustaining competitive advantage in the long run (Penrose 1959; Hoopes, Madsen & Walker, 2003) is restated. Proper resource management becomes a managerial practice for the interaction of SMEs with third parties, aimed at facilitating the exchange of knowledge.

Methodologically, the study also contributes to resource management (and to RBV & DCA in general) by originally proposing to apply Fuzzy Set Theory as a means to operationalize the testing process for core resource status.

Concerning its contribution to Networked Innovation Theories and managerial practices, the study shows how the shift from a closed-access and stand-alone approach to innovation to a networked process involving several firms of diverse typology and size is driven by and at the same time affects a Small Business’ R&C&C endowment. Small Businesses involved in networked innovation environments not only need to change or renew their physical resources and assets; they are also required to adapt their organizational and managerial practices, as well as their overarching cultural stance towards innovation as a multidimensional process.

Networked innovation implies that assets enabling cooperation and integration of inputs generated either internally or externally in a co-generation environment gain competitive edge: this is the case for Self-Publishing Platforms allowing an open collaboration with innovation generators, that is, software developers. At the same time, internal assets – e.g. Service Creation systems – are to some extent subject to a process of sharing with other network members, thus requiring to elaborate feasible solutions – e.g. basing the open Software Development Kits released to developers on a bulk of proprietary technology – for avoiding the risk of knowledge spillover or free riding.

Managerial routines, practices and strategies are subject to radical changes as well, as SMEs are to balance their “inward” and “outward” focus, properly equilibrating the internal complexity management and the external diversity orchestration. SMEs need to pair their ability to gather internal resources for content and service presentation with their capacity to leverage on incumbents’ resources, departing from their traditional role of trusted follower and taking on the one of enlightened leader of the innovation process; recognizing their growing social embeddedness, they need to cultivate the dynamic capabilities related to resilience and adaptation, assuming that the external environment changes are more rapid, more frequent and less controllable than the internal, firm-wise ones; and, more subtly, they should refine their sensitivity towards the benefits and positive externalities coming from the design of innovation as a shared, co-evolution path.

As the present study confirms, within a networked innovation paradigm, new inter-firm ties emerge for Small Businesses, as establishing relationship with new actors become significant, if not vital. In the case of Mobile SMEs, traditional downstream relationships with content and services distributors – i.e. Portal or Store owners – are currently paired to upstream relationships with innovation generators – i.e. single developers or other content providers –; SMEs shall follow a dual approach so as to become appealing for both categories, thus carving a central positioning within the newly shaped value network.

Consistently with the findings from Street and Cameron (2007), the RBV and the DCA are good rationale a Small Business can follow when taking decision on inter-firm alliances, since partner selection is a direct function of both the resources that the Small Business is currently lacking – e.g. creativity on one side, and distribution channels on the other – and the assets or resources that a partnering firm can offer.

As this concluding section shows, the innovation paradigm discontinuity is a complex, multifaceted issue: the proposed framework supports both researchers and practitioners in assessing this condition of critical discontinuity. Future research shall be directed towards the provisioning of framework validation in different contexts characterized by the rise of networked innovation, where a resource-based approach can disclose major strategic and innovation implications and help managers to identify, to evaluate and to take good care of the true sources of their competitive advantage.
References


