Business Models for PSI Re-Use: A Multidimensional Framework

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Abstract

In recent years the Open Data philosophy has gained a considerable momentum. In the public realm the free release of PSI datasets, besides enabling new and promising forms of governmental accountability, paves the way to third-party developed products and services. Nevertheless, PSI re-use performed by private sector entrepreneurs is striving to take-off due to the presence of numerous inherent roadblocks which are coupled with a certain vagueness surrounding the rationale underlying business endeavors. Taking stock of this evidence, the paper aspires to shed light on the mechanisms allowing profit-oriented value creation based on public datasets. In order to delve into PSI-based business models, the paper proposes a conceptual framework meant to pinpoint prominent levers that a business developer has at his/her fingertips for crafting the overarching architecture of a business venture hinged on public data re-use.

Keywords

Open Data, Big Data, Public Sector Information, Policy Making, Business Model, Sustainability.

1. Introduction & Context

Every year individuals, businesses and public administrations create (and rely on) amounts of digital data that are orders of magnitudes bigger than a few years ago: the amount of digital information increases tenfold every five years and, thus, information has gone from scarce to superabundant in a while [1]. This relentless trend is accompanied by a soaring traction gained by the "value" of data: in fact, probably unhinging principles "etched in the stone" which have driven economists for centuries, the datum has been defined as "an economic raw input almost on par with capital and labor" [1] and as "an innovation currency in the digital age" [2].

In this resulting "big data" scenario, the role of public agencies in creating, elaborating, consuming and releasing information is often not completely understood. Public bodies, for their part, are by far the largest producers of information in Europe and not only. However, even though public information is recognized as a fundamental building block of the "new economy" peculiar to the Information Society, it has been portrayed so far as an under-exploited asset [3].

Generation, management and usage of data constituting what is normally called PSI (Public Sector Information) represent a very large topic which has recently attracted significant interest from both the practitioners' and scholars' communities. A first and vivacious literary production flourished with reference to the role of PSI as a propellant in the pursuit of a more transparent, participatory and collaborative Government. Beyond this strand of contributions, a first glance on the overarching literary landscape reveals that a common thread running through numerous studies is a generally held view that there probably is a great deal of commercial potential sitting there in PSI just waiting to be exploited. However, the actual value has only been alluded to in terms of anecdotal evidence or tenuous value estimates based on local market research data [4].

By putting the entire literary production in this field under a common roof, it could be gathered that many of the studies published hitherto on the topic have directed their attention towards the interplay between two aspects: the quantification of PSI value (answering the question "how much is it worth?") and the focus

on "upstream information"[1]. This dominant school of thought has its roots in the belief that once data is made available to the public, the "invisible hand of the market" will take care of the rest. The nuanced message that transpires is that a relatively unexplored area is the one related to "how" is it possible to create (and appropriate) value from "downstream"[2] PSI.

Such gap has undoubtedly represented excellent food for thought, stimulating our research reflection. Our reasoning has been conducted through the qualitative lens in order to investigate mechanism allowing to turn a public good[3] such as PSI into viable business endeavors with spillover effects on the socio-economic ecosystem.

2. The Proposed Framework and its Theoretical Foundation

Trying to find a way in the maze of "downstream information", we conceived a conceptual framework aimed at pinpointing the pivotal dimensions of PSI-based business models: such a framework may be used in order to formalize the business logic of an enterprise committed to re-use public data for profit purposes. By suggesting a novel clue for depicting PSI-based business models, the framework is intended to map the value creation process and to point out relevant building blocks of the underpinning business rationale.

The proposed framework has its roots in one of the seminal contributions that could be spotted in the strand of literature devoted to business models: in particular, the brand-new framework stems from the pillars of the "canvas" [5], i.e., a formalism which emphasizes nine vital areas of a business model (i.e., value propositions, customer segments, customer relationship, channels, revenue streams, cost structure, key activities, key resources, key partners) in compliance with the enterprise-centric vision provided by the Business Model Ontology [6].
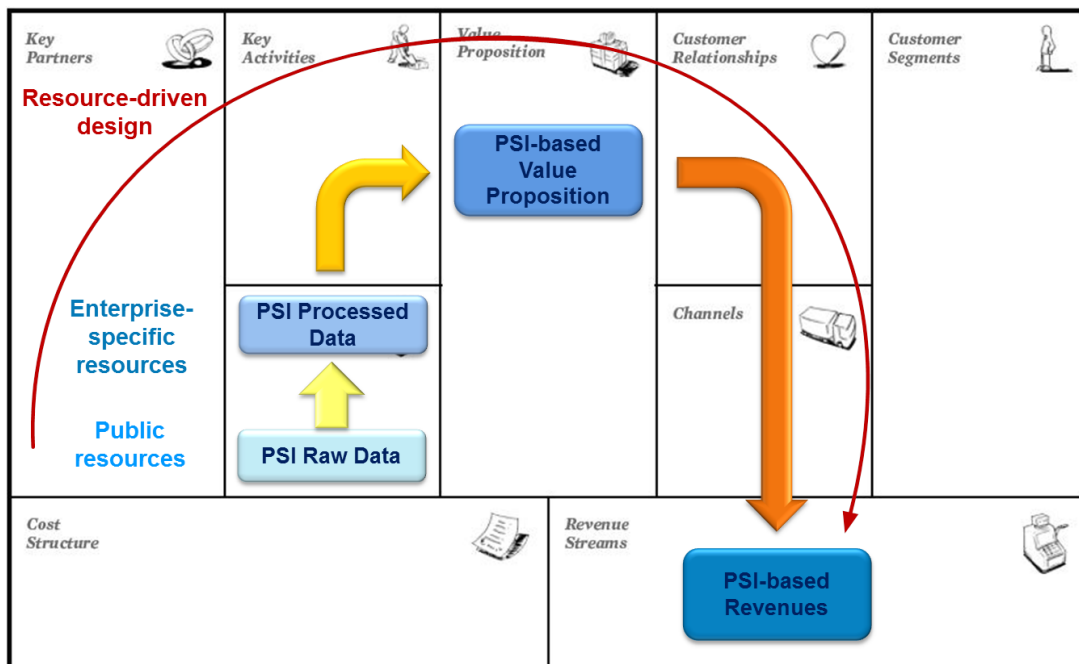

Figure 1 – Framework for PSI business model analysis ("canvas" view)

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[1] "Upstream information" could be defined as the public information for which the PSI holder is the sole source and faces no significant competition in its supply [7].

[2] "Downstream information" is the public information supplied by a PSI holder that can be seen as being, at least potentially, in competition with information from other suppliers [7].

[3] When PSI is released in accordance with the "Open Definition" [8], it could be considered as a public good, i.e., a good that is non-rival and non-excludable. In this circumstance, the adherence to the Open Data paradigm implies the total openness of data, so that everyone is allowed to retrieve and use PSI datasets, which cannot represent a source of competitive advantage *per se*.

As illustrated in Figure 1, in the case of PSI re-use the epicenter of the business model lies in a resource (i.e., one or many PSI datasets) which is accessible by everyone if the public data is released in accordance with the Open Data paradigm (i.e., without technical, legal and price barriers). Subsequently, such a raw resource is elaborated in order to become an enterprise-specific asset that distinguishes the respective owner from the rest of the world. Such processed data is an ingredient of the value proposition that the enterprise offers to the market. To say it with other words, elaborated data is "packaged" and embedded in the bundle of products and services which is supposed to create value for at least one customer segment. In return to such a value, customers generate revenues for the enterprise through alternative forms of payment.

By eclipsing building blocks of the "canvas" which are not touched by the trajectory of the resource-driven design and by adopting the pyramidal metaphor, it is possible to obtain a simplified and intuitive visual representation (Figure 2) which highlights afore-mentioned pillars as well as entities representing the "glue" between different layers composing the stack[4].
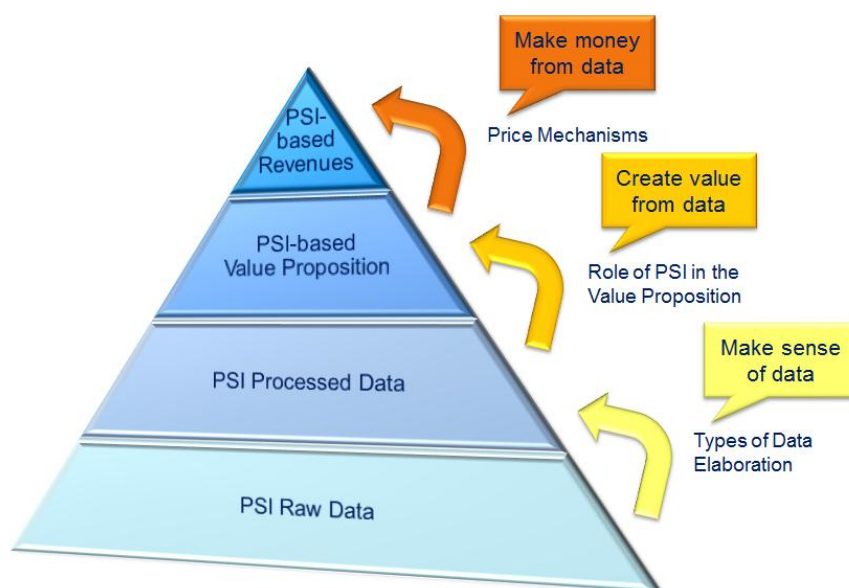

Figure 2 – Framework for PSI business model analysis ("pyramid" view)

The three entities representing the "glue" between different layers of the stack could be considered as levers of business modeling and may be combined in a unique *corpus.* Ideally, dimensions contained in the resulting "dashboard" (Figure 3) might symbolize the decision levers that a business developer has at his/her fingertips for molding the overarching architecture of a business venture hinged on public data re-use. For each depicted dimension a checkbox template has been adopted in order to guarantee a flexible structure fitting also with sophisticated business logics.

The resulting "dashboard" embodies three business model levers which are succinctly described as follows:

1. Types of data elaboration specify which operations are performed on retrieved data in order to make sense of it and to differentiate it from its primitive features.
2. The role of PSI in the value proposition explains how elaborated data is "packaged" to render the offer compelling to customers' eyes.
3. Price mechanisms define how created value is appropriated in the guise of revenue streams by the enterprise under examination.

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[4] A configuration in this vein points out the logic according to which a layer serves the layer above it and is served by the layer below it, as it happens in well-known schemas such as the Maslow's pyramid and the ISO/OSI reference model.
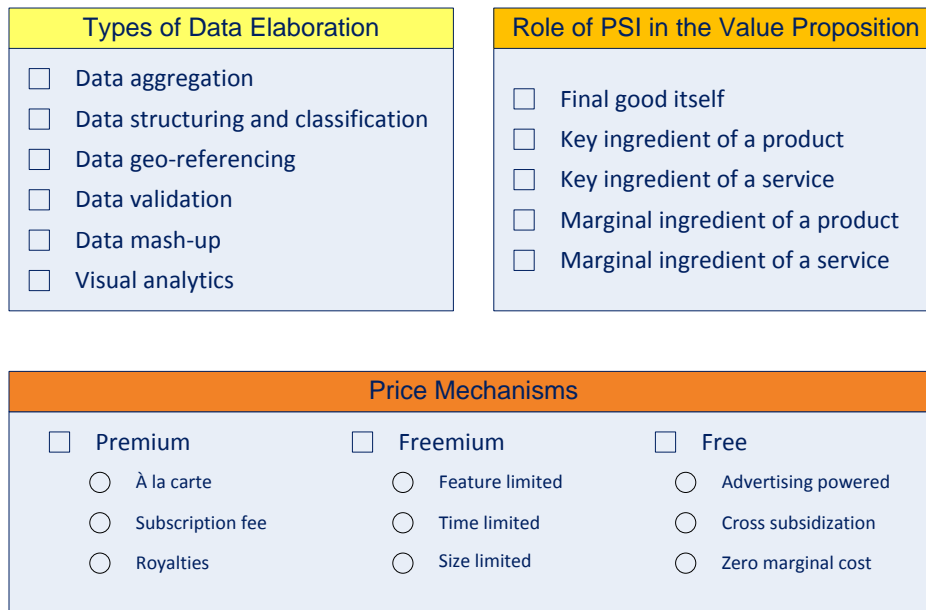
Types of Data Elaboration	Role of PSI in the Value Proposition
☐ Data aggregation ☐ Data structuring and classification ☐ Data geo-referencing ☐ Data validation ☐ Data mash-up ☐ Visual analytics	☐ Final good itself ☐ Key ingredient of a product ☐ Key ingredient of a service ☐ Marginal ingredient of a product ☐ Marginal ingredient of a service

Price Mechanisms		
☐ Premium	☐ Freemium	☐ Free
○ À la carte	○ Feature limited	○ Advertising powered
○ Subscription fee	○ Time limited	○ Cross subsidization
○ Royalties	○ Size limited	○ Zero marginal cost

Figure 3 – Framework for PSI business model analysis ("dashboard" view)

3. Application of the Framework in a Real Exploratory Study

The framework previously depicted found a first testing ground in the international study [9] we carried out under the sponsorship of Piedmont Region government (Italy), one of the most active European administrations in the Open Data landscape. The afore-mentioned exploratory study adopted a qualitative research approach making use of case study methodologies in order to describe and interpret mechanisms of value creation and appropriation put in place by PSI-based enterprises.

The prominent source of information was represented by interviews: engaged informants were entrepreneurs, executives and business developers who operate in firms having business lines devoted to PSI re-use. Units of analysis involved in the sample were companies located mainly in Europe, while a minor share of them was headquartered in the American continent. Selected enterprises have been chosen taking also into account the position covered in the process of value creation, distinguishing between enablers and *tout-court* re-users[5].

In this research blueprint, the systematic recourse to the framework was crucial in the design of business models deriving from individual case studies as well as in the formalization of archetypal business models meant to generalize recurring patterns observable in PSI-centric ecosystems under the lens.

A crystal clear vision in terms of emerging business models led to main findings pertaining to:

- mapping of most significant re-use experiences present on an international scale;
- identification of "ideal types" of PSI-based market arenas;
- characterization of main strategic positions that may be employed for the classification of PSI re-users;
- description of archetypal business models in view of the position covered in the value chain and of the strategic choices made.

Furthermore, the afore-mentioned main findings were accompanied by a set of policy recommendations in terms of:

- definition of a clear legal framework capable of surviving periodical administration changes;
- setting up of higher standards in terms of data quality and updating;
- promotion of a new organizational culture among civil servants allowing to appreciate the value inherent in PSI as well as to clearly distinguish between property and stewardship of data.

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[5] Whilst the first group encompasses intermediaries focused on retrieval, storage, categorization and exposure of public data, the latter one is made up of firms that craft products or services adding value to PSI raw data by means of "proprietary" application logic.

4. Conclusive Remarks & Opportunities for Future Research

It is no doubt that the PSI has enormous social value and economic potential. In the brightest scenario, re-use massively exploits the value of PSI, brings to the market new promising products and services, increases employment and promotes the prosperity of the information market, becoming a "hope" for the future of a sustainable Information Society. Furthermore, rosy expectations and fervent impulses coming from the scientific community may render the PSI re-use also "hype", being hugely debated and promoted often in spite of outstanding results.

The study we carried out takes stock of the contributions already present in the literature and proposes a slightly different angle from which to look at the problem, leveraging the qualitative approach and focusing on the "downstream information".

The prominent outcome of the research endeavor is constituted by a conceptual framework whose mission is to visualize any PSI-based business model making reference to its relevant dimensions.

Regarding the adopted methodology, it has become paramount to craft an appropriate "concept" able to simplify the Business Model Ontology "canvas" by weeding out some pillars which are not distinctive of the PSI realm. In line with *a priori* research objectives, the consequent loss of abstraction renders the brand-new framework less general and more "vertical", i.e., tailor made for the specific domain under investigation and potentially adaptable to any data-intensive business venture.

The opportunity of applying the conceived framework in the exploratory study summarized in section 3 has provided us with a set of feedback. Such stimuli have represented a precious starting point for the refinement of the framework which has been conducted via a continuous and thorough fine-tuning.

Although still in its infancy, the conceived framework represents a promising stepping stone on which to stand for the creation of a new breed of analyses covering the "business side" of public data re-use. Trying to envisage future works along this direction, next step may be to resort to the framework in order to examine the several hundreds of proposals usually submitted in national and international contests for PSI-based apps. Analytical studies in this vein might be an "acid test" for the framework under examination as well as an unprecedented chance to grasp trends, correlations and meaningful patterns, sometimes implicit, emerging from the aggregate mass of submitted proposals.

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