



2nd GLOBAL CONFERENCE on BUSINESS, ECONOMICS, MANAGEMENT and
TOURISM, 30-31 October 2014, Prague, Czech Republic

Infonomics and The Value of Information in The Digital Economy

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Abstract

Globalization and integrated development of the economy significantly expands the possibilities of business. The world has entered a new digital epoch: here the activity of the organizations is mainly in the production and use of information technologies and accumulated information to make all other forms of production more efficient and thereby ensure a new quality of economic growth, and creating greater wealth of information (information products and services). Distinctive feature of a new science “infonomics” is: information obtains a measurable economic value and other features that qualify it as any other kind of asset, significant strategic, operational and financial reasons to do so exist. It is noteworthy that the information may meet accounting standards, but nevertheless it is not reflected in any public balance sheet of a company. Based on the data obtained during the research the author comes to the conclusion that the era of major information transformations in order to remain competitive and profitable, management of the enterprises must learn to use the information of their companies to create new products and services or even a new market. The results of the study expand the notion of infonomics: shows the methods of accounting information as well as factors affecting the information assets and their economic value, noted that infonomics it is a discipline that deals with the determination of the value of information, however, at present this phenomenon raises more questions than it answers, but the more interesting it becomes his study.

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Selection and/ peer-review under responsibility of Academic World Research and Education Center

Keywords: Infonomics, information, enterprise, asset, value, data.

1. Introduction

In the digital economy, information is digitized and transmitted via digital networks, a new world of opportunities appears for business development. The widespread introduction of advanced information and digital

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technologies have the strongest influence on business, not only in Russia but also all over the world. More and more people and businesses are being introduced into the new information space. Huge amount of information can be compacted and imparted at high speed anywhere in the world. Various forms of information can be combined creating, for example, multimedia documents and etc. Information can be stored for a very long time and it provides instant access to most of the information recorded by human civilization. New digital devices are created so that they can fit in your pocket (or even smaller), it's very important and has a huge effect on most aspects of business and personal life of a modern man. Nowadays information is valuable to your company, as well as funds. Information is a very specific item because you can buy or sell it avoiding dozens of countries and customs, as well as use it for your business growing.

Already one can highlight a few hosting providers offering services of information data storage in so-called "cloud storage." In the period of large data transformations, a business has to ask: How can I use my company's data to create new products and services? How can I collaborate with other organizations to share information on a new business project? How can I enter a new market or even create a new market using company's information data?

2. A brief review of the companies, which use information to create new products and services.

The art of effective business management today is in successfully combining of the latest modern information technology, information, and in the ability of rapid mobilization of these resources for the company's accelerated development. Information and information technology are used in all economy sectors, somewhere in greater extent, somewhere less, but the fact is that they are used. Their effective usage allows companies to be competitive. Those who do not use all the possibilities of information and information technology will be forced to leave the market. During the study we tried to identify several key sectors of the economy and the ways of information and information technology usage to create new products and services in these sectors.

Table 1. Usage of information and information technology in the economy key sectors.

Economy sector (industry)	Ways of information and information technology usage to create new products and services
Energy sector	Using the data, such as weather forecasts and historical data, energy providers can offer new services to their customers, so that they can control the energy flow.
Services sector : hotels, restaurants	Usage (collaboration) of such services as booking.com, TripAdvisor and similar ones to sell services. Using special mobile services and social networks, such as: Foursquare (4sq) and others to attract new visitors, as well as preparation of various special offers with the help of such services.
Telecommunications industry	Competing mobile service providers try to offer large-scale mobile commerce services for brands which want to improve their intelligence of loyalty marketing programs.
Health services	Using information about a person's health, offering him appropriate (paid) services. On-line consultation in order to attract customers. Individual reminders of medical examinations.
Internet	There are a lot of different ways , as the most promising and new can be identified - Cloud data store: all your files can be stored in the cloud, where they will be available anytime and everywhere - from any mobile and stationary device , browser, or from a variety of popular social networks. It's available both to individuals and organizations (both free and paid services).
Financial services sector	Using transaction data in order to offer merchants valuable information about their area customers.
Automotive industry	Data collection about the car services and driving features by using telematics, this information is available for insurers and consumers and can reduce insurance rates.

Light industry	The creation of «smart cars» (automatic control of technical inspection time, maps and directions via satellite, etc.) Creation of " Smart Clothing " (warms or cools according to the information about the weather conditions , contains information about the manufacturer and the seller) , "Smart Shoes " (with built-in gps)
Building (Construction)	As a result of information usage the construction of "smart roads" is realized: they warn drivers about dangerous share appearance , track the status of the traffic and react to emerging issues , " recharge " from passing cars and are able to charge electric cars while driving . Construction of " smart houses " : security and fire alarm systems , house appliances , lighting, heating is carried out not only according to the weather, but also taking into account a number of other factors such as the wind strength, according to the prediction , the time of the day .
Education	Access of paid and free online educational courses and resources allows to get an education in the short term period, according to the individual education program, affordable self -education.

Companies in every sector of the economy desperately try to use the information to improve their business. But while the race is on the information usage between companies, a large piece of information assets is invisible on corporate balance sheets due to the fact that the information is not an asset. This discrepancy sometimes leads to a deadlock legal systems around the world and prevents the company to manage and use their information as one of its assets. Question of the economic value of the information is in the spotlight after the terrorist attacks of 9/11. Many large companies have lost valuable data of their business, insurers compensated the cost of hardware and material assets but the data was not of value.

3. Literature review

The term infonomics has been coined to convey the underlying value of information in terms of its production, market demand, and economic impact (Regazzi, 2013).

In reviewing the literature on infonomics, it was found that in the early 1990s in the U.S., analyst Doug Laney introduced the concept of «Infonomics» to describe their own research around quantify information evaluation, its cost and definition of information as a real asset of the enterprise (Laney, 2012). This concept has been emerged from the work of Laney with data storage pioneer Prism Solutions (now part of IBM), where he and his colleagues have developed testing methods for qualitatively and quantitatively evaluating the quality characteristics of the original data and the potential cost of the business. It is assumed that the data is valid when it is used in decision-making, infonomics says that information should be considered as an asset.

Gartner has developed a set of tools for creating the cost of information, and outlined that the assessment will be made as individual records and as the usage of different criteria (completeness, quality, uniqueness). Data set, which is owned by a company and not available on the market, has a higher value.

Bannister (2013) in his report «Accounting for the value of (big) data» noted that some European companies are able to use the knowledge which is gained from the analysis of large amounts of data to improve customer relationships, rationalize production and new product development. Since the information provides potential future economic benefits, it should be treated as an asset of the company. Information has always been a valuable asset for those who possess it (Bannister, 2013). It is noteworthy that all production besides kilowatt power consumption and tons of steel consumes a lot of megabytes of information and still unknown how much. Getting in the product information does not disappear - because we can always remove it back, measuring and examining the item (Branscomb, 1994).

It is noteworthy that all production besides kilowatt power consumption and tons of steel consumes a lot of megabytes of information and still unknown how much. Getting in the product information does not disappear - because we can always remove it back, measuring and examining the item (Sucharev, 2010). On the basis of this study we present the main factors which, in our opinion, may affect the cost of information.

Table 2. Factors affecting the cost of information

Value.	The data which is necessary for the enterprise. Scale of information value.
Accuracy.	Data corresponds exactly to reality and verifiable from the appropriate source.
Conciseness.	Brevity, conciseness: set out only the necessary information, unencumbered with unnecessary data.
Integrity.	Entries do not have any gaps.
Availability.	Data can be easily retrieved and / or integrated into business processes.
Detail.	Data is written with the accuracy which is required for the business.
Timeliness.	Data is updated with sufficient frequency to meet business requirements.
Speed (urgency).	The length of time which is spent on search and retrieval of information.
Relevance.	The data which is useful for one or more business processes or decisions.
Applicability.	Business process (es) and / or individuals who are able to understand and use the data.
Plausibility.	Credible data by those who provide them.
Clarity.	Data has a particular importance and can be easily understood.
Objectivity	Data is objective and impartial and does not depend on the judgment, interpretation and evaluation of individuals.
Uniqueness.	Classified data, difficult to remove, specific information.

Despite the fact that the information is not yet a recognized asset, the enterprise should consider it for internal reporting. It includes the use of evaluation methods on a regular basis. Data obviously has value: it can be sold and the loss or compromise of it causes financial loss to the owner. But how to calculate the cost of specific data? Doug Laney (2012) writes about the method that can do it. Laney offers to carry out the information accounting with the following methods (Laney, 2011):

Method 1: The Value of Information (VI):

What is the probability that the other organization has the same information? Specifies the intended level of the value of information.

$$VI = \text{Completeness} * \text{Accuracy} * \text{Availability} / \text{Ubiquity (prevalence)}$$

Method 2: The Value of Information for Business (VIB):

The value of information for the business process: How good is the data? How does data apply to business or to a particular business process? How quickly can we get fresh data?

$$VIB = \text{Accuracy (trueness)} * \text{Completeness (Integrity)} * \text{Relevance} / \text{Delay (waiting time)}$$

Method 3: Loss of information value (LIV):

Information has a cost : How much is to replace the data and what are the financial implications for the company if the data will be lost for a period of time (t)?

LIV = price of information acquisition + Σ (1, t) Loss of income

Method 4: Value of Information Productivity (VIP):

The value of information for business purposes which is presented in the form of key target efficiency indicators (KEI).

Method 5: The Economic Value of Information (EVI):

Final financial value of information assets: Value productivity of information (VIP) for the indicator: income, deduction for acquisition costs, administration and use of the information.

Method 6: Market Value of Information (MVI):

Income that can be received by sale, leasing or using, sharing this information. How much are the business partners ready to pay for access to this information?

MVI = Σ (t, p) + Exclusive Price +Discount rate

Theoretically, these methods are clear, however, their application in practice seems to be more difficult, how to compare them , how do you know whether they are true ? It is still unknown how and what is the best way to apply these methods and under what circumstances. Infonomics is a new and rapidly developing theory, but at this stage there are many questions, the answers to which we are not ready to give yet, but we work on their resolving.

4. Conclusion

It is necessary to carry out very large-scale studies for infonomics to become clear to everyone and start to work, however today this sphere becomes the subject of numerous studies. The results show that the information is processed by enterprises within a wide variety of systems, often unrelated to each other. Ensuring their wide availability for all employees (as well as external partners) and thereby facilitating the adoption of creative solutions can be a critical success factor for many businesses. Nowadays the trend of information importance growth is evident: leading organizations in almost every industry - including retail, financial services, manufacturing , construction, education and telecommunications - understand the benefits of information in the income formation and sometimes even more important than some traditional assets. Although many modern business leaders and IT leaders recognize the growing importance of information still they do not consider it as one of the business assets to be assessed. Based on the data which is received during the study, it is logical to conclude that in the era of large data transformations in order to remain competitive and profitable, management companies must learn to use the information to create new products and services or even a new market. It should be noted that the information becoming important productive resource, turning into the products, the final result of the production process, has appeared to be also unlimited resource, but at the moment modern businesses do not "see" the information as its asset. Considering the information through the prism of economic value one can provide some interesting future directions for the "digital economy." One of the ideas is the emergence of so-called "information banks", which will provide the same services for the information assets of enterprises that conventional banks provide for financial assets. Already one can highlight a few hosting providers that offer storage of information data. In our opinion, in the nearest future such services sector will grow rapidly. A vast field of research is the study of dynamic and highly relevant theories of Infonomics. How will this science develop in our country and abroad? How does it affect the operation of modern enterprises? At the moment the phenomenon of infonomics puts more questions than answers

so that it becomes more and more interesting to study it.

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