

## Awareness of Cloud Computing in Slovenian and Croatian Micro-Enterprises

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### Abstract

This paper presents a comparison of the two studies conducted in Slovenian and Croatian micro-enterprises ( $\mu$ E) about the awareness of the cloud computing (CC). We were interested in the issues relating to the characteristics of  $\mu$ E and the latter's use of information and communication technology (ICT) in business processes. Also, the characteristics of owners and  $\mu$ E were investigated. We found that the results obtained in the two countries were similar. In both cases, the most important CC characteristics were reliability, security and performance. Given that CC could represent a good business opportunity for  $\mu$ E, some managerial implications are proposed.

**Keywords:** comparison, cloud computing, cloud computing services, micro-enterprise, Slovenia, Croatia

### 1. Introduction

The story of cloud computing (CC) goes back to the last century, but it was only a few years ago, notably in 2007, that the technology reached a level that enabled launching of the first CC research [33]. Two years later, in 2009, the first commercial CC solutions came into view. According to Rittinghouse and Ransome [33:4], the key characteristic of CC are: the centralization of infrastructure and lower costs, the increased peak-load capacity, the efficiency improvements for the systems that are often underutilized, the dynamic allocation of CPU, storage, and network bandwidth, and the consistent performance monitored by the provider of the service. Service offerings are most often made available to specific consumers and small businesses that see the benefit of use because their capital expenditure is minimized. These and similar facts about CC encourage us to focus our research on  $\mu$ E awareness of CC.

In Slovenia, there were 165.959 enterprises registered in 2010, of which 94.18% micro-enterprises ( $\mu$ E), 4.3% small enterprises, 1.28% medium-sized and 0.2% large enterprises [38]. The overall share of  $\mu$ E organized as an individual private entrepreneur was 53.6% and of legal persons 46.4%. Most employees work in large enterprises (30.99%), followed by  $\mu$ E (26.98%), medium-sized (24.87%) and small enterprises (17.15%).

Similar was the ratio of Croatian enterprises in 2010. Most of them were  $\mu$ E (92.0%), followed by small (6.6%), medium (1.2%) and large enterprises (0.3%) [21]. In 2010, Slovenian

$\mu$ E generated around one fifth of the total turnover (20.1%). Similar share of annual turnover was generated by small (19.8%) and middle-size enterprises (25.6%). In some studies  $\mu$ E are represented only by entrepreneurs. Most readers are so well informed about the notion, concept of "entrepreneurship" and "entrepreneur" that they need no explanation, yet, according to Anderson et al. [2], the concept of entrepreneurship itself remains nebulous, broadly conceived, open to a range of definitions and differently employed. It is hardly surprising that there is no concordant and comprehensive definition of the entrepreneur [28]. Besides, no generally accepted definition of a micro-enterprise can be found in the research literature. The most common criterion for a micro-enterprise is the total number of employees, often combined with some financial indicators, such as the firm's annual turnover and assets. In the absence of a precise definition,  $\mu$ E are defined in different contexts in various business cultures. Sometimes, the definition of a micro-enterprise depends on the industry [22].

If we know for a fact that the number of  $\mu$ E organized as legal and private persons (entrepreneurs) is similar (46% and 54%) [38], then we can assume that the whole group needs special attention. In the last decade, the European Union (EU) recognized the importance of micro, small and medium-sized enterprises in terms of growth and economic development. Within the category of small and medium-sized enterprises (SMEs), a micro-enterprise is defined as an enterprise that employs fewer than 10 persons and whose annual turnover and/or annual balance sheet in total does not exceed EUR 2 million [10]. Slovenia and Croatia as the EU member states accepted this recommendation.

In view of the impact of  $\mu$ E on the economy, the recent Slovenian and Croatian statistical data and the current legislation, we decided to conduct a research on  $\mu$ E awareness of CC. The first study was conducted in 2010 in Slovenia, the second in 2012 in Croatia. In this paper we present a comparison of the results achieved.

## 2. Literature review

### 2.1. Micro-enterprises

It must be noted that the role of SMEs and, consequently, the role of the  $\mu$ E in the European countries has reached the highest political level, which is additionally stressed in the document "Think Small First - A Small Business Act for Europe" [11]. To understand the nature of  $\mu$ E we must know their characteristics, more precisely, their organizational features, management, use of strategic planning, use of ICT, owner's and employees' characteristics and the environment surrounding the companies. Enterprise characteristics can be, according to Levy/Powell [26] described by five stages of development.

1st Stage of Growth: Commencement. Organisations in this stage have the following characteristics:

- Lack of financial resources to purchase ICT, training, etc.
- Corporate strategy can be described as „survival“ and maintaining its position in the competitive environment of the market.
- Limited number of employees.
- Insufficient knowledge of ICT.
- Communication with customers and suppliers only by e-mail, phone or mail.
- Information support is provided through an office software package.
- Failure of customers to comply with financial obligations.
- Poor specialization of employees with everybody doing whatever is needed

2nd Stage of Growth: Survival. Enterprises with several successful years of operation will reach the ability to cope with all market demands, so they hire more part-time or full-time employees and are challenged with new organizational problems that demand ICT support. Most of them will then hire an accounting or bookkeeping service to support their business process.

3rd Stage of Growth: Successful Position on the Market. The company is successfully growing and the manager conceives a mid-term plan. In this phase of development further

growth of the company significantly depends on the approach of the manager or owner. The use of ICT is based on applications such as CAD (Computer Aided Design – software design application), in addition to accounting and other administrative applications. They will tend to integrate electronic shopping and organizational structure into their business model.

4th Stage of Growth: Expansion. With an increasing number of employees a need arises for the owner to formalize the organizational structure and to delegate responsibility. In most cases this is the barrier between micro and small business. They use standard ERP (Enterprise Resource Planning), systems for the communication with their partners, so they utilize the electronic exchange of data.

5th Stage of Growth: Maturity. These organizations typically have more employees (80-250) managed by a team of managers and a hierarchical structure of leadership is established.

According to Levy and Powell [26] we can conclude that  $\mu$ E are predominantly in the first three stages of growth.

Articles on  $\mu$ E practically do not exist so far, since  $\mu$ E are included among SMEs and entrepreneurs. Therefore, the characteristics of small businesses which are in many cases similar to  $\mu$ E are presented below. In most cases  $\mu$ E work in an environment that impedes their progress and development.  $\mu$ E are negatively affected by the following environmental factors [3:141]:

- Low economic power compared to large companies.
- Difficult access to capital and, consequently, limited ability to finance development activities.
- Restricted access to specialized training and education, as compared to larger companies.
- Limited access to necessary information and consultancy services.
- Unfair competition from large companies and dumping prices of imported products.
- Limited sale of finished products on the domestic market and increased cost of export.
- Competition of retail organisations managed by financially strong companies.
- Weak position in public tenders.
- Failure to and delay in receiving payments resulting in the secondary financial insolvency.
- High administrative demands from government bodies and agencies.

Policy-makers often think that creating more start-up companies will transform depressed economic regions, generate innovations, and create jobs [36]. This belief is flawed because the typical start-up is not innovative, creates few jobs, and generates little wealth. Policy-makers should stop subsidizing the formation of the typical start-up and focus on the subset of businesses with growth potential [36]. In many cases we can find  $\mu$ E formed in order to save on human costs. Employees are put in a situation to establish their own business and work as subcontractors or else they become unemployed.

One of possible factors ensuring a firm's success is adoption and use of ICT, which implies the use of CC. A research by Antlová et al. [4] identifies the most important ICT competencies that influence a long-term growth of the SMEs. They suggest that managers or owners of SMEs should support educational activities in this area, which should also motivate universities to help SMEs increase their competitiveness with the educational internship.

Similar results were obtained by Peña et al. [31], where ICT was found to have a positive impact on the market orientation and outcomes while, similarly, the adoption of the market orientation was found to have a positive effect on the outcomes of smaller service enterprises based in rural areas. In the research paper by Brodar, Klačmer Čalopa and Pihir [5] ICT was identified as a generic organizational factor which impacts on the structural and contextual organizational elements.

In a research by Burke et al. [7] we found results that show personal characteristic of an owner as important as those of a die-hard entrepreneur. For men, inheritance encourages

persistence, and facilitates initial self-employment. Having a self-employed father as a role model makes their sons persist longer. Similarly, higher levels of education tend to be associated with entrepreneur persistence among both males and females. However, somewhat surprisingly, early experience of unemployment does not affect the probability of self-employment, while reducing persistence.

In Gill et al. [17] an effort was made to extend the findings relative to the factors that affect the propensity of small business owners to grow and expand small businesses. The findings suggest that these factors include perceptions of the lack of expertise, family-business role conflict, and the lack of management skills. Similarly, in the study of Verhuel et al. [41] differences were found between female and male entrepreneurs notably that on average women invest less time in the running of business than men. Study by Širec and Močnik [39:32] investigated the Slovenian entrepreneurs' personal characteristics to understand the existing gender gap. They found out most explicit differences on the side of female entrepreneurs resulted in their higher need for achievement and lower risk tolerance. As it is expected that a positive correlation exists between risk attitudes and the decision to become an entrepreneur, part of the gender gap is explained. A supportive environment is essential as it should encourage men and women to decide to pursue an entrepreneurial career in the near future.

Especially in  $\mu$ E the role of owner/leader attitude towards democratic or autocratic leadership is distinct. Contrary to the expectations in some cases  $\mu$ E owners use more democratic leadership as in larger firms. In research by Kovač and Jesenko [24:30] a comparison of trust between the four groups of leaders studied showed that by increasing the level of democracy in leadership, an increased level of trust occurs between the superiors and the subordinates.

In  $\mu$ E the decision-making process is often intuitive rather than based on reliable, precise and unambiguous information. In particular, innovative business ideas require people to make decisions based on very little evidence [23].

Small firms generally lag behind medium and large companies in adopting and implementing computerization [22], [25]. This is due to severe constraints on financial resources, the lack of in-house expertise, and a short-term management perspective imposed by a volatile competitive environment. The average technical efficiency for large firms is higher than that of SMEs [40]. The estimates on the determinants of technical efficiency show that being a subcontractor has a statistically significant positive influence on SMEs' technical efficiency, but the effect decreases with larger firm size.

In contrast,  $\mu$ E demonstrate a high level of adaptability to changes in the environment. They use ICT for automation of the existing processes, rather than for decision support, or to increase the flexibility of the firm and thereby gain competitive advantage. Whereas large firms are typically capital and equipment intensive, labour-intensive  $\mu$ E may be able to increase productivity and provide value-added services through increased computerization and digitization [25].

Sahandi et al. [35] made a survey in the UK on a sample of 300 SMEs showing their views on investment in CC. SMEs show high interest in CC, especially in the field of cost reduction and improvement of flexibility and scalability. These benefits are the main driving force for SMEs to adopt CC, but they are also concerned with some potential problems, such as: privacy, vendor lock-in problem and general suspicion towards security in cloud.

The study of Koellinger [23] provides empirical data on the emergence of different types and degrees of entrepreneurial innovativeness. The results suggest that entrepreneurial innovativeness depends on both individual factors and the environment in which the individual lives. In particular, high educational attainment and a high degree of self-confidence are significantly associated with entrepreneurial innovativeness at the individual level.

Wiklund et al. [43] focused on an analysis of data from 413 small businesses and derived a set of propositions that suggest how entrepreneurial orientation, environmental characteristics, firm resources and managers' personal attitudes directly and/or indirectly influence the growth of small businesses.

Empirical research of Novak et al. [30] was conducted on a population of 667 Slovenian micro- and small enterprises gathered from the subjects of an innovative environment database,



and a further sample of 51 chosen technology parks from Group A. They found that better provision and management of knowledge do lead to a better performance and, consequently, to a greater satisfaction of employees.

Neves et al. [29] made a literature review and PEST analysis of SMEs experience in investment in innovative technology taking into account political, economic, social and technological factors related to CC adoption. They concluded that CC is likely to be an attractive option for many SMEs, particularly in the current global economic crisis, due to its flexible cost structure and scalability.

Hansen and Hamilton [19] investigated the firm growth factors where owners and managers of growing firms contrasted with the non-growth firms in their growth ambitions, their optimism and opportunistic strategic thinking. The growing firms were more adaptable, proactive and innovative, particularly towards international market opportunities.

In the study of Pšeničný and Novak [32] special emphasis was placed on establishing the factors that affect growth of dynamic enterprises. They found that the most important factor of growth is the entrepreneur as the holder of the administrative/governance (ownership) and management. Only in the case of a company with over 50 employees, the entrepreneur is required to strengthen the company with professional managers, consultants and, to a greater extent, employees in the decision-making and management processes.

Formal and informal networking seems to be one of the essential factors for the survival and growth of a micro-enterprise [17]. Owners and managers of the growing businesses were highly networked individuals and they emphasized how important this was for success. The most important were private business networks, which were largely formed and developed through involvements in multiple businesses. In the research of Watson [42] the association between networking and firm performance for both female and male-controlled SMEs was analysed. The results also indicate that several formal and informal networks are positively associated with a firm's survival but only formal networks appear to be associated with its growth. In particular, accessing an external accountant is associated with survival and growth.

The intranet could be a very suitable tool for company's internal communication [20]. The range of intranet usage is wide where it can be only a notice board for information on one hand and it can also be a full-value communication portal which makes the internal communication process more effective on the other hand. It should be emphasized that internal communication has a significant impact on company's operations, job performance, work behaviour and attitudes of employees. Internet as the basis for CC is therefore indispensable for the introduction and use of CC. Several ICT areas have to be developed in conjunction with the promise of CC to be realized [45]. These include (but are not limited to) the development of parallel programming paradigms and the open source software, Cloud access to high performance computing, Green IT, investment in low-cost access-cum-computing devices and hi-speed networks.

## 2.2. Cloud Computing

By now the CC is well known but still not in use as predicted few years ago. There is a hodgepodge of providers, both large and small, delivering a wide variety of Cloud Services (CS).

Amazon.com has played a vital role in the development of CC. In modernizing its data centres after the dot-com bubble burst in 2001, it discovered that the new Cloud architecture they had implemented resolved in some very significant internal efficiency improvements. By providing access to its systems for third-party users on a utility computing basis, via Amazon Web Services introduced in 2002, a revolution of sorts began. In 2007, Google, IBM and a number of universities began working on a large-scale CC research projects. The first annual CC conference was scheduled to be hosted online April 20-24, 2009 [33:8].

According to Fingar [15:36], the Cloud comprises three aspects: Cloud computing - CC, Cloud platforms - CP, and Cloud services - CS. It seems that CS offer many opportunities for  $\mu$ E. Low-cost access and computing devices are expected to play a pivotal role in the adoption of CC among the masses, especially in the developing countries [12]. We know that the majority

of  $\mu$ E have outsourced accounting and bookkeeping to external partners. Also, it is not unusual that small enterprises outsource IT and IS [34]. CC with its services is also some kind of outsourcing of software (SW), hardware (HW) and platform. Most authors define CS as:

SaaS – Software as a service,

IaaS – Infrastructure as a Service,

PaaS - Platform as a Service.

Other authors, such as Fingar [15] and Rittinghouse and Ransome [33], would add also MaaS (Monitoring as a Service) and CaaS (Communication as a Service) and many others. Various business models achievable through CC were presented and described in the most recent paper by Chang et al. [8] as a comprehensive overview of future business framework, especially for SMEs.

### 3. Research approach

After having reviewed the literature on  $\mu$ E and CC, a structured interview framework was developed to help us address the research objectives. We expected that the awareness of the CC existence among  $\mu$ E in both countries would be low and would depend upon the characteristic of the business [44], [24], [3] and the characteristics of the owner [41], [39], [42]. In addition to the demographic questions about the respondents and the enterprises, 17 questions on the characteristics of CC were formulated based on the extensive literature review [16], [15], [33] and the local specifics (native language, legal issues, etc.). The importance of CC characteristics for the respondents was rated on a 5-point scale (1 - not important at all, 5 - very important).

The main research questions were:

**RQ1: Are  $\mu$ E aware of the existence of Cloud computing?**

**RQ2: Where  $\mu$ E get information about novelties in ICT?**

**RQ3: What kinds of Cloud computing services are preferred by  $\mu$ E?**

**RQ4: What kinds of Cloud computing characteristics are important for  $\mu$ E?**

**RQ5: Is the use of Cloud computing in correlation with any other factors found in enterprises?**

Data were collected via structured interviews with owners or top managers of  $\mu$ E in Slovenia in 2010. In Croatia survey was conducted via personalized letter send to e-mails of owners or top managers of  $\mu$ E that includes a link to web-questionnaire for gathering of responses. Survey in Croatia was conducted during the year 2012 as extension of Slovenian survey (set of the same questions) and carried out according to data from Croatian Chamber of Commerce. In the questionnaire, mostly closed-response questions were used. Except for demographic data, respondents either rated statements on a scale from 1 to 5, or responded to multiple-choice questions. In total, we conducted 125 interviews in Slovenia and collected 58 questionnaires in Croatia. We experienced a decrease in the response rate in classical mail surveys from micro-business owners from 15% ten years ago to 1% in the recent study. Therefore, we decided on the web-based questionnaire in Croatia which did not assure the expected feedback either.

The sample sizes in the comparable international studies are similar to our sample. Chuang et al. [9] had a sample of 97 enterprises in a study of the extent of information technology adoption in SMEs. A total of 126 enterprises were used to measure ERP adoption of small and medium enterprises by Shiao et al. [37]. Gutierrez et al. [18] used 104 surveys from enterprises around the world in order to identify the factors which affect IT and business alignment.

## 4. Results

### 4.1. Characteristics of enterprises

The respondents come from companies with a broad spectrum of activities and sizes. The overall share of individual entrepreneurs in Slovenia was 60.0% and 12.1% in Croatia. The share of limited liability companies in Slovenia represented 36.8%, while in Croatia their share was 87.9%. Enterprises organized in other organizational forms represented only 3.2% of the

sample in Slovenia, while in Croatia firms of other forms were not included in the sample. In the Slovenian sample the dominated form of  $\mu E$  was a private entrepreneur, while in the Croatian sample most companies were those with limited liability. Descriptive statistics data for Slovenian and Croatian  $\mu E$  are presented in Table 1.

		Slovenia		Croatia	
Year of the study		2010		2012	
Number of respondents		125		58	
		Mean	Std. Dev.	Mean	Std. Dev.
Average number of employees		2.9	2.2	4.8	2.4
Average number of employees 3 years before the research		2.4	2.3	5.8	3.1
Self-estimation of their computer knowledge (from 1 - very poor to 5 - very good )		3.1	0.9	3.8	0.8
Age of the oldest computer		3.8	2.1	4.1	2.6
		Percentages		Percentages	
Age of respondents	21-25	20.8%		3.4%	
	26-30	16.0%		13.8%	
	31-45	39.2%		51.7%	
	46-55	22.4%		25.9%	
	over 55	1.6%		5.2%	
Highest level of respondents' education	vocation level/secondary school	56.0%		34.5%	
	higher vocational level	20.8%		20.7%	
	graduate / postgraduate	23.2%		44.8%	
Gender of respondents	female	26.0%		41.1%	
	male	74.0%		58.9%	
Organizational form of enterprises	private entrepreneurs	60.0%		12.1%	
	limited liability companies	36.8%		87.9%	
	others	3.2%		0.0%	
Outsourced accounting and bookkeeping		76.0%		71.9%	
Non-members of the Chamber		15.2%		1.9%	
Usage of illegal software		59.0%		50.9%	
Internet browser		94.4%		91.4%	
Archiving to external drive		50.4%		51.7%	
Loss of business data		51.0%		56.1%	
Business data were not retrieved		33.0%		24.2%	
Cause of fault – HW		42.0%		43.8%	
Antiviral protection		93.0%		98.2%	

Table 1: Descriptive statistics for Slovenia and Croatia Appendices

Also, the average number of employees in the samples varies. The Slovenian  $\mu E$  employ on average 2.87 employees (standard deviation 2.19) while in Croatia the average number of employees is higher, 4.84 including the owner (with the standard deviation of 2.44).

We also compared the number of employees in the company on the day of the interview/web questionnaire, and three years earlier and found the difference between the two countries.

While the number of employees in the Slovenian  $\mu E$  increased (Table 1), the number of employees in Croatia decreased. In order to determine if the reason for such differences lies in the sample size from Croatia or the actual trends there, we used the statistics data of the Croatian SMEs in 2010 [1]. We found that the average number of employees in small businesses in Croatia indeed decreased from 5.1 in 2008 to 4.7 in 2009 and 4.4 employees in 2010 [1:Table 4]. The average number of employees in small businesses given in Table 1 of that report was

between 5.1 and 4.4, so we can assume that the majority of them are actually  $\mu$ E. It is also interesting that, like in Slovenia, the number of small businesses in Croatia in this period was increasing from 87,807 in 2008 to 95,004 in 2010 [21].

The majority of Slovenian  $\mu$ E (76.0%) outsourced the accounting and bookkeeping to external partners specialized in selling accounting services to small and micro enterprises. Similarly, in Croatia there were 71.9% of such  $\mu$ E. Table 1 compares descriptive statistic data between Slovenian and Croatian samples.

The highest level of education of the respondents is dependent on the domicile country of the enterprise ( $\chi^2 = 9.896$ ,  $p = 0.007$ ). The highest percentage of the respondents in Slovenia had a vocation level or secondary school (56.0%) whereas in Croatia the highest percentage of respondents had a graduate or postgraduate level of education (44.8%).

The age of the respondents is dependent on the domicile country of the enterprise ( $\chi^2 = 10.109$ ,  $p = 0.018$ ). For example, in Slovenia there is a higher percentage of younger respondents 20.8% (25 years or younger) than in Croatia (3.4%).

The gender of the respondents is dependent on the domicile country of the enterprise ( $\chi^2 = 3.896$ ,  $p = 0.048$ ). We have 73.6% of male respondents in Slovenia and 58.9% in Croatia. Statistically significant differences were found in the evaluation of respondents' knowledge of computers between Slovenia and Croatia ( $t=-4.735$ ,  $p=0.000$ ), where self-estimated knowledge was statistically higher in Croatia (3.78) than in Slovenia (3.07). In the Slovenian sample there are smaller micro enterprises, predominantly family owned private enterprises. In the limited liability companies that are not owned by families, the level of education of managers is defined by the position in businesses and is usually not below a graduate degree. On the other hand, in family owned business secondary school is in most cases required by the law.

There are statistically significant differences in the average investments in HW ( $t= -4.657$ ,  $p=0.000$ ) between Slovenia (EUR 1093.04) and Croatia (EUR 3419.74) as well as in the average investments in SW ( $t=-7.312$ ,  $p=0.000$ ) (EUR 412.4 and EUR 2102.98, respectively).

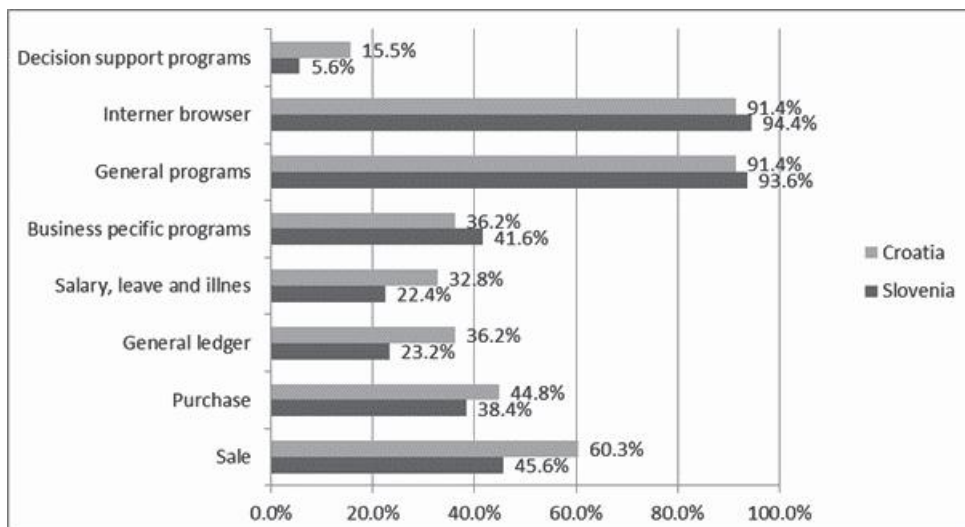


Figure 1. Use of SW programs in  $\mu$ E

To understand this difference the usage of SW in  $\mu$ E samples has to be compared (Figure 1). We can see the differences in favour of the Croatian  $\mu$ E that use significantly higher number of business programs such as sale, purchase, general ledger, salary and others business related SW. So, if we also take in account that the Croatian  $\mu$ E from the sample have in average a higher number of employees, then they also need more ICT. Accordingly, the difference in the HW and the SW investment is understandable. Our results agree with Lee et al. [25] in that  $\mu$ E use ICT for automation of the existing processes rather than to facilitate decision-making (6-16%).



We can conclude that there are differences in the characteristics of samples especially in the size of enterprises, the characteristics of respondents and the investments in HW and SW. Accordingly, it was expected that the importance of CC characteristics would be different as well.

**4.2. Cloud computing and micro-enterprises**

One third of the respondents in Slovenia were aware of CC (RQ1), and the remaining (67%) learned about it for the first time when interviewed. It should be emphasized that the percentage of respondents who already knew something about CC grew in the final phase of the data collection in 2010. Given the delay of almost two years, a higher percentage was expected from the respondents in Croatia than from those in Slovenia. Among them, 62.1% had already heard of CC, while 37.9% heard about it for the first time. We tried to establish where micro enterprises obtain information (RQ2) on the novelties in ICT. We used ranking from 1 to 7, where 1 denoted the most important source of information and 7 the least important one. Results obtained in both countries are given in Figure 2.

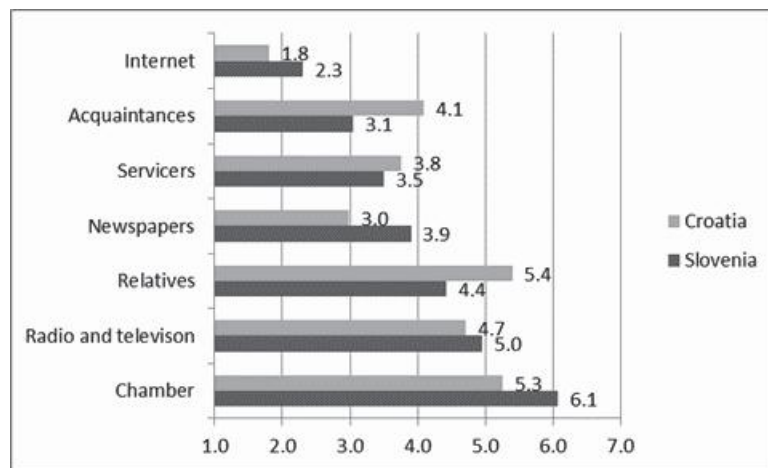


Figure 2. Sources of information on novelties in ICT for µE

The comparison is particularly interesting, since the Internet in both countries was ranked high as a source of information on the novelties in ICT. In Slovenia the acquaintances were ranked second as a source of information (3.1), followed by servicers (3.5), whereas in Croatia the second place was taken by newspapers (3.0) and the third by servicers (3.8). In both countries the Chamber has a small role in the acquisition of information. In Croatia, the least important role in the acquisition of information was assigned to relatives (5.4).

In Slovenia, 15.2% of µE in our sample are not members of any Chamber. Among the companies in the sample from Croatia there are only 1.9% of non-members. The difference is probably due to the mandatory membership in the Chambers of Commerce in Croatia, whereas in Slovenia this form is no longer mandatory for all enterprises. To confirm the correlation between the membership in the Chamber of Commerce and Industry in Slovenia and the knowledge of CC, we conducted a  $\chi^2$  - test.

To provide minimum required data for each cell of the contingency table (where theoretical frequency should be at least 5), we merged the data from the Chamber of Commerce with the Business-Chamber of Commerce and other Chambers and compared the data with the Chamber of Commerce and the Industry, the Chamber of Crafts and Small Business and those that are not members of any Chamber. The correlation between the membership in the Chamber of Commerce and Industry and the knowledge of CC exists ( $\chi^2 = 9.971, p = 0.019$ ) and its significance is at the level of 5%. Among members of the Chamber of Commerce and Industry the share of enterprises that are familiar with CC is 51%. Only 31% of enterprises among non-members of Chambers are familiar with CC.

What kind of support have  $\mu$ E received from Chambers? Most responses among the Slovenian and Croatian respondents were in terms of being informed about the novelties (44.8% / 56.9%), management consulting (27.2% / 15.5%), education (25.6% / 29.3%) and business networking (19.2% / 17.2%). Regretfully, only 4% of micro-business received support in penetrating foreign markets. Among Croatian companies, only 2.8% received such support.

Figure 3 shows that despite the differences between the studied samples there is no significant difference in the relevance of the individual CC characteristics.

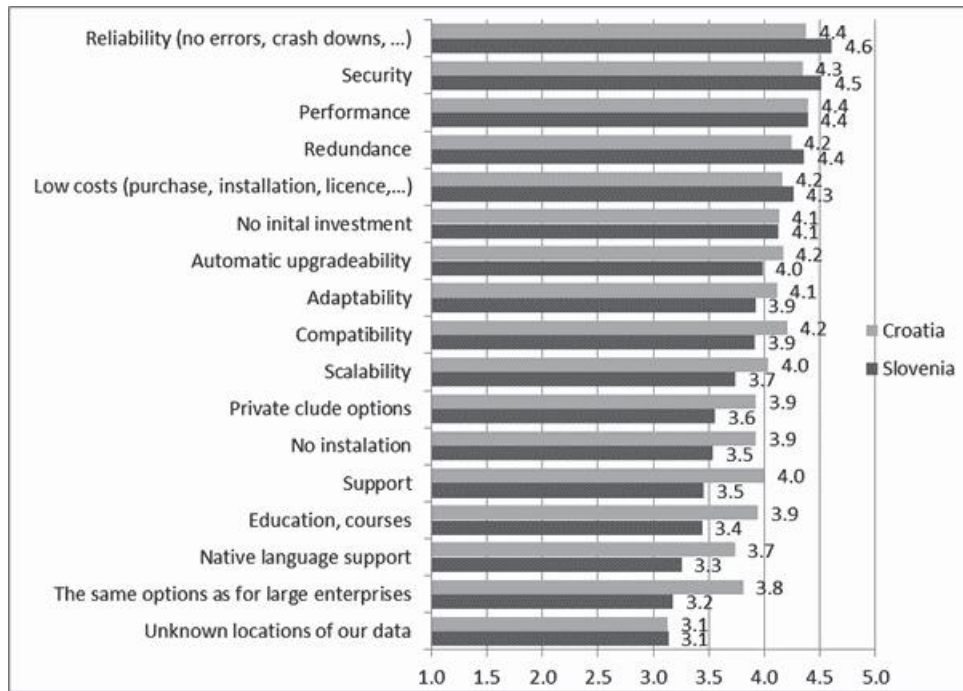


Figure 3. Characteristics of CC ranked by their importance in Slovenia and Croatia

The most important characteristics of CS on a scale from 1 to 5 for the Slovenian and Croatian  $\mu$ E were: reliability, security and performance. Similar results were found also by IDC Enterprise Panel convened in September 2009 [16], attended by 263 CIOs. They were asked to rate the challenges/issues of the 'cloud'/on-demand model. Security ranked the highest (87.5%), availability came second (83.3%) and performance third (82.9%). We can agree that security and reliability play important role when a micro-business owner has to decide on adopting CS. As stated by Miller [27:29], one of the disadvantages of CC may be the fact that it can be slow. We can confirm that  $\mu$ E owners agree with that.

In both countries performance was ranked third with regard to importance. In contrast, owners do not think that the options equal to those available to large enterprises, the software solutions available in native language and the location of business data are very important for their businesses.

Figure 4 shows preferences of  $\mu$ E owners as regards the type of CS that they would like to use in their businesses. The majority of the Slovenian  $\mu$ E (44.0%) are interested in IaaS (Cloud data store resources and backup), followed by (38.4%) SaaS (business software, general programs, etc.) and 28.0% showed interest in the full package (HW, SW, programs). A different situation was found in the case of Croatian owners. Most of them would use a full package (43.1%) and only 19.0% would use just cloud SW solutions. We can assume that the reason lies in the larger size of the Croatian enterprises in the analysed sample.

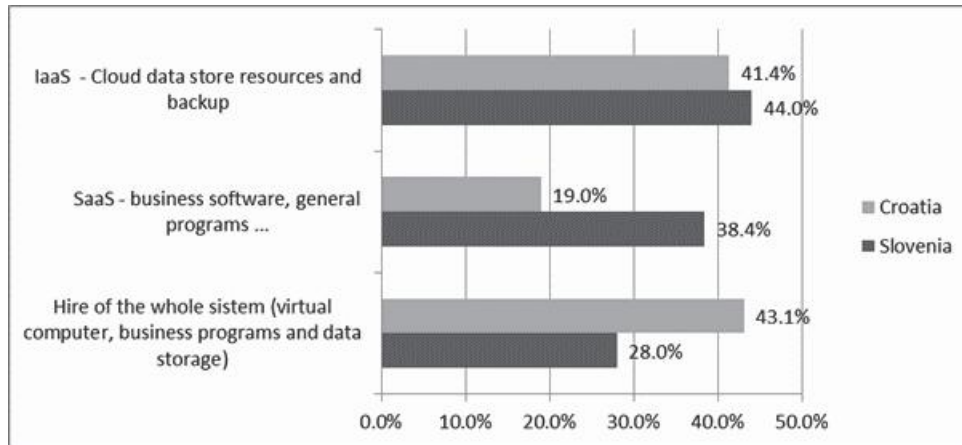


Figure 4. Service of CC according to the suitability for  $\mu E$

Further, we were interested if there were some other important factors that affect CC awareness (RQ5). To find that out, we constructed a model of significant factors in correlation with CC awareness.

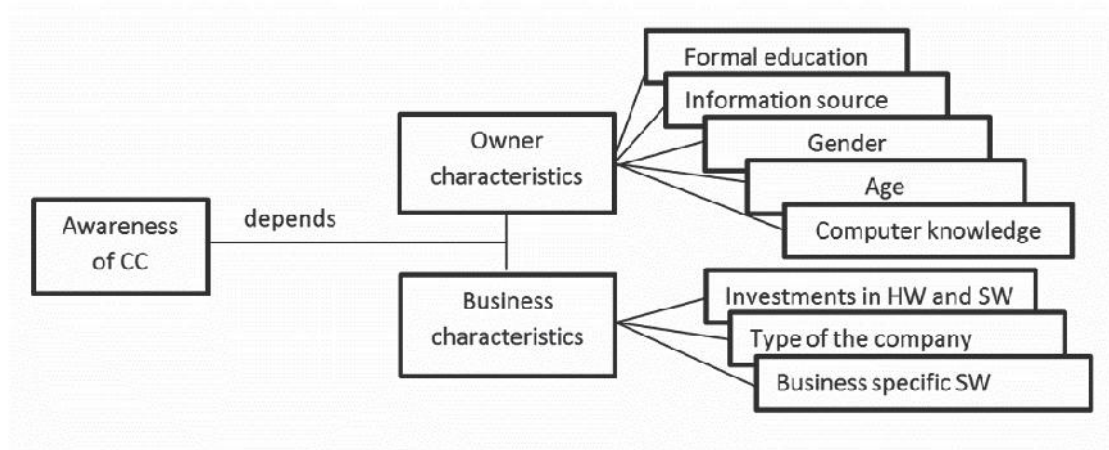


Figure 5. Model of significant factors affecting CC awareness

**Owner's characteristics.**

- **Formal education of the owner:** ( $\chi^2$ - test for Slovenian  $\mu E$ :  $\chi^2 = 11.147$ ,  $p = 0.025 < 0.05$ ) - higher level of his/her education, the more familiar he/she is with CC. The analysis of Croatian data shows a similar trend, but not statistically significant.
- **Sources of information:** ( $\chi^2$ - test for Slovenian  $\mu E$ :  $\chi^2 = 24.950$ ,  $p = 0.000 < 0.01$ ) – owners who personally search information are more aware of CC. The same conclusion is true also for Croatia ( $\chi^2$ - test:  $\chi^2 = 4.687$ ,  $p = 0.03 < 0.05$ ), where 75.9% of the respondents who personally search information have knowledge about CC.
- **Computer knowledge:** (t-test for Slovenian  $\mu E$ :  $t = 5.538$ ,  $p = 0.000 < 0.01$ ) – those employees who are familiar with CC have higher self-awareness of computer knowledge (3.68) than those who are not familiar with CS (2.77). A similar trend is evident from the data pertaining to the Croatian sample, but it is not statistically significant.
- **Gender:** There are statistically significant differences between men and women in assessing the significance of CS characteristics. In Slovenia, women assigned more importance to the following CCS properties:
  - Operation (t-test:  $t = -3.304$ ,  $p = 0.001$ ,  $\bar{x}_F = 4.70$ ,  $\bar{x}_M = 4.28$ ),
  - Native language support (t-test:  $t = -2.431$ ,  $p = 0.017$ ,  $\bar{x}_F = 3.70$ ,  $\bar{x}_M = 3.09$ ),

- Private cloud options (t-test:  $t = -2.080$ ,  $p = 0.040$ ,  $\bar{x}_F = 3.94$ ,  $\bar{x}_M = 3.42$ ).  
Interestingly, in average women also assessed all other options relative to the characteristics of the CC higher than men. In the sample from Croatia, no statistically significant difference was found in assessing the characteristics of CC between the genders.
- **Age:** In the Slovenian sample, age was detected as an important factor among the three CC characteristics. When respondents from Slovenia were divided into two groups, aged 25 years and older, the following differences in the ratings of CS characteristics was found (higher rated by younger):
  - Reduce of the costs (t-test:  $t = 4.310$ ,  $p = 0.000$ ,  $\bar{x}_{\text{younger}} = 4.73$ ,  $\bar{x}_{\text{older}} = 4.13$ ),
  - Does not require installation (t-test:  $t = 3.206$ ,  $p = 0.002$ ,  $\bar{x}_{\text{younger}} = 4.08$ ,  $\bar{x}_{\text{older}} = 3.39$ ),
  - The possibility of a private cloud (t-test:  $t = 2.232$ ,  $p = 0.030$ ,  $\bar{x}_{\text{younger}} = 3.96$ ,  $\bar{x}_{\text{older}} = 3.45$ ).

As for the Croatian sample, no differences were found between the two age groups as regards the relevance of CC characteristics.

### *Business characteristics*

- **Investment in HW and SW.** Slovenian data show that the companies aware of the CC invest on average almost three times more in software and hardware (SW EUR 726; HW EUR 1,848) than the companies which have no knowledge of CC (t-test for SW:  $t = -3.312$ ,  $p = 0.012$ ; t-test for HW:  $t = -3.312$ ,  $p = 0.000$ ) Data). The data obtained from the Croatian sample show double investment in software and hardware by companies aware of CC (SW EUR 2,445; HW EUR 4,232) than those who do not know CC (SW EUR 1565; HW EUR 2,142), but the difference is statistically significant at 5% significance level only in the case of hardware
- **Awareness of CC and type of company.** The following two characteristics of CC are statistically much more important to the private entrepreneurs in Slovenia:
  - Reduces the costs (t-test:  $t = 2.946$ ,  $p = 0.004$ ,  $\bar{x}_{\text{p.e.}} = 4.47$ ,  $\bar{x}_{\text{l.l.c.}} = 3.89$ ).
  - Does not require installation (t-test:  $t = 2.652$ ,  $p = 0.004$ ,  $\bar{x}_{\text{p.e.}} = 3.61$ ,  $\bar{x}_{\text{l.l.c.}} = 3.41$ ).

For  $\mu E$  from Croatia no differences in CC characteristics were found in terms of the type of business.
- **Implementation of specific business programs** (graphics, engineering, design, etc.). A total of 46.2% of Slovenian companies which use programs, specific for their business, are aware of CC, whereas others only in 23.3% of cases ( $\chi^2$ - test:  $\chi^2 = 7.204$ ,  $p = 0.007$ ). In the Croatian  $\mu E$  no such pattern was observed ( $\chi^2$ - test:  $\chi^2 = 1.312$ ,  $p = 0.252$ ).

It can be concluded that answers to questions in some cases depend on the characteristics of interviewees / respondents and those of enterprises. Based on the findings, it can be concluded that CC solutions and their presentation should be micro-adjusted for different user groups (for example, formal education, gender, age, high-tech companies, etc.).

## **5. Conclusion and discussion**

Given that the importance of micro-enterprises ( $\mu E$ ) in terms of economy is no longer questionable, we encourage other researchers to study them too. To avoid the discrepancies in the literature, we suggest the use of  $\mu E$  for abbreviation of micro-enterprises.



Based on the comparisons made, we can assume that today CC is known (RQ1) to more than a half of the  $\mu$ E from both countries (Croatia = 62.1%) and indeed we can say that CC is still in its infancy. Given the characteristics and opportunities of the CC, we can agree with Rittinghouse and Ransome [33] in that CS are a useful solution for  $\mu$ E especially in the beginning when they are still unable to invest in HW and SW. The Slovenian Chamber of Commerce and Industry was very active in 2010. It organized several conferences, meetings and presentations on CC. It also seems to have reached the  $\mu$ E, since there is a statistically significant difference between members and non-members of the Chamber of Commerce and Industry with regard to CC awareness. Nevertheless, we were surprised that the respondents from both countries rated the role of Chambers as the least important when it comes to providing novelties in the field of ICT, given that they search for information on the Internet (RQ2) by themselves.

The majority of Slovenian  $\mu$ E (44.0%) are interested (RQ3) in IaaS, followed by (38.4%) interested in SaaS and 28.0% in the full package (IaaS and SaaS). A different situation was observed in the Croatian  $\mu$ E. Most of them would use a full package (43.1%) and only 19.0% would use just cloud SW solutions. We could not find any statistical reason for those differences.

In contrast to the above, we can agree that there are almost no differences between the two countries when we compare the level of importance of CC characteristics to  $\mu$ E owners (RQ4). Despite the different samples of respondents the most important CC characteristics in both countries were reliability, security and performance. That is in agreement with the results obtained from the CIOs of some large enterprises [16]. They assessed the same CC characteristics as the most important ones, which agrees with our findings in that over 50% of  $\mu$ E lost their business data and additional 24% did not manage to retrieve them from the backup. It seems that these bad experiences actually contributed to their perception of importance of CC characteristics. The possibility of obtaining equal options as those available to large enterprises, the access to software solutions in a native language and the location of business data seem to have less importance. In addition to the formal education, knowledge of computer science and gender of owners, we also evidenced other factors that had an impact on the answers obtained, but we did not consider them as highly relevant. Thus, formal and informal knowledge and skills are still among the most important factors of the successful use of the ICT in  $\mu$ E and the implementation of CC in the daily running of business (RQ5). Here we see an opportunity for and obligation of the Chambers and the governmental agencies to disseminate new knowledge among  $\mu$ E owners and managers by taking advantages of the ICT and CC opportunities.

We were witnesses to crashes in the Cloud services in both small and large companies, so the reasonable doubt still exists. On the other hand, with the lack of proper computer skills and resources, the current safety in  $\mu$ E in both countries is at a low level. At the same time, CC provides a higher level of security. Now it is up to CC providers, foreign and domestic alike, to raise interest also in  $\mu$ E as CS users. Our results can help them select those  $\mu$ E owners or managers who are more likely to be in favor of using CC. They should search for young, highly educated male owners/managers with a higher self-estimated level of computer knowledge, look up for their information on the Internet or search those employed in the  $\mu$ E that use specific business software programs and who can be placed at the 3rd stage of growth by Levy and Powell [26]. They can also use our study results on the average spending on SW and HW as a level of investment and make their offers suitable for  $\mu$ E as well. These results are similar with Microsoft recommendation given on annual meeting of Microsoft certificate partners in 2014. They proposed characteristics of potential customers of Microsoft CC services that were almost equal to our results.

## 5.1. Managerial implications

CC represents a good business opportunity, but  $\mu$ E will have to use more advantages from it in the future since we know from other studies [6], [46] that most of them have sufficient ICT equipment and adequate software already installed. If we know that more than seventeen percent of  $\mu$ E from both countries use the outsourcing for their accounting and bookkeeping,

these companies are also potential users of CC. At the same time, companies that offer CS should adapt their advertising, products and services in accordance with  $\mu$ E and thereby reduce scepticism among them. The Competitiveness and Innovation Framework Programme (CIP) of European Community [13] with small and medium-sized enterprises (SMEs) as its main target, supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions. It encourages a better take-up and use of ICT and helps to develop the information society. The CIP runs from 2007 to 2013 with an overall budget of EUR 3,621 million. One of the three operational programmes is specially dedicated to the use of ICT, called The Information and Communication Technologies Policy Support Programme (ICT-PSP) by European Commission [14], aimed at stimulating a wider uptake of innovative ICT based services and the exploitation of digital content across Europe by citizens, governments and businesses, in particular SMEs. In collaboration with the Chamber, the Government and their enterprise services should help  $\mu$ E seize these opportunities offered by EU.

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