CHARACTERISTICS OF RESPONDENTS IN BUSINESS WEB SURVEYS IN CROATIA: CASE OF STATISTICAL METHODS USE SURVEYS

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Abstract:
Due to their high importance, in the paper the characteristics of respondents, here employees, who participated in two business web surveys conducted on the sample of Croatian enterprises in 2012 and in 2016 are investigated. In both surveys the same questionnaire about statistical methods use in enterprises was used. If all observed characteristics of respondents are taken into account it can be concluded that the most common in both surveys are respondents who are males with more than 20 years of work experience, with graduate level and who are positioned as top managers in the enterprises.

Keywords: Croatia, enterprises, respondents' characteristics, statistical methods use, web survey

JEL code: C12, C14, C83

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Introduction

Survey can be described as a systematic method for collecting information from different entities to describe attributes of the researched population of which the entities are members (Groves et al., 2004). The survey process is consisted of different stages. One of such stages is the questionnaire design, which involves a certain number of steps in the development of a questionnaire (Swain, 1985, Oppenheim, 1992, Burgess, 2001, Diem, 2002). In the first step the decision about information and data, which should be collected, should be made. In line with that step, the target population should be precisely defined. In dependence of the observed target population, their availability and availability of sampling frames, appropriate survey mode or mix-mode survey designs are chosen. Afterwards, the questions are formed according to the desired information that wanted to be collected. In the process of forming the questions, the attention should be given to word ordering, length and clarity of questions, and similar. In the next step, all questions should be put together in a meaningful order. According to the used survey mode, questions should be formatted in an appropriate way. The following important step is to check the length of the questionnaire. If it is too long, some questions should be omitted from the questionnaire. In addition, some questions could be rewritten to simplify them. The length of questionnaire can be reduced by changing format and style of questions, e.g. open-ended questions convert to close-ended questions. After that, the questionnaire should be pretested to check if all filter questions, skips and similar, work as they should do. Of course, a pilot study can be also conducted for further improvements of the questionnaire. After pretesting and pilot study the final survey questionnaire is developed.

The steps in questionnaire design seem to be straightforward but many different things can be incorrectly specified. As a consequence of that, low response rate can be achieved and/or data of bad quality can be collected. Those problems can arise because specific characteristics of respondents are not taken into account. For example, some respondents could see some questions as offensive, too sensitive or rude ones (De Maio, 1984, Schaeffer, 2000, Tourangeau, Yan, 2007). Furthermore, respondents could have problems in understanding of questions because unfamiliar and rare words are used or they are not familiar with some specific terms (Slavec, Vehovar, 2015). Some respondents could have some problems with certain survey modes (Meckel, Walters, Baugh, 2005, Roberts, 2007).

Previously mentioned examples all pointed out that at least some basic knowledge about respondents and their characteristics is needed. In case of web surveys, research has shown that respondents tend to be wealthy, higher educated and younger (Atkin, Jeffries, Neuendorf, 1998). Kwak and Radler (2002) investigated respondents' characteristics in web surveys and concluded that younger, male and those with greater technological sophistication tended to be over-represented. Similar, Couper, Blair and Triplett (1999) concluded that males and the educated are more likely to respond by e-mail than regular surface mail. Roster et al. (2004) have shown that respondents in web surveys are younger than respondents in telephone surveys.

In the paper the characteristics of respondents in business web surveys are going to be investigated. A business survey is a specific kind of a survey where unit of interest is an enterprise but the reporting unit is an employee. Despite some problems, web surveys are used more and more due to their advantages over the other survey modes (Žmuk, 2017). It is expected that characteristics of respondents in business web surveys are similar to characteristics of respondents in other web survey. Because of that the research hypothesis of the paper is the following one: the most represented respondents in business web surveys are males with low work experience and with an, at least, graduate degree.

After a brief introduction, in the section 2 survey data is shown and methods of analysis are proposed. In the section 3 the analysis of respondents' characteristics in the observed surveys is conducted. Final section concludes the paper and brings suggestions for further research.

Data and methods

In the paper, data from two business web surveys are going to be used. The topic in both surveys was the use of statistical methods in enterprises. Because the same topic was used in both surveys, more comparable results are going to be. If surveys with different topics would be observed, the danger that very different respondents would participate in the surveys exists. Furthermore, the first survey was conducted in 2012 and the second one in 2016. Because both surveys share the same topic, changes in respondents' structure could be observed also.

In order to get reliable results of changes in respondents' structure, both surveys use the same questionnaire. However, there are two versions of the questionnaire. The first questionnaire version is given to enterprises in which statistical methods are used whereas the second one got enterprises in which statistical methods are not

used. In order to split the enterprises on those that use statistical methods and those that do not use them, the first question in the questionnaire was a filter question. The questionnaire version intended for enterprises that use statistical methods had more questions and because of that it is somewhat longer than the questionnaire version intended for enterprises that do not use statistical methods. The questionnaires were designed very carefully. The benchmarked and estimated duration of a survey for enterprises that use statistical methods was 15 minutes whereas it was expected that respondents from enterprises that do not use statistical methods would need up to 5 minutes to complete the survey.

In both surveys the Croatian Company Directory of the Croatian Chamber of Economy has been used as the sampling frame (Croatian Chamber of Economy, 2017). For the purpose of surveys only Croatian enterprises that are registered in the Court Register of the Republic of Croatia as limited liability enterprises (Official Gazette, 2011). That way only the joint stock enterprises, limited liability enterprises and simple limited liability enterprises are observed. All such enterprises with provided e-mail have been contacted and invited to participate in the survey. The invitation letter was sent to 26,186 enterprises in 2012 and to 37,855 enterprises in 2016.

The majority of questions in the questionnaire were mandatory. On that way not all respondents have answered on all questions. Furthermore, some respondents started to answer questions but at some point they give up and they dropped out from the survey. In the paper, respondents' characteristics are only observed. Because of that it is not necessary that respondents have completed the whole questionnaire. The only important thing here is that respondents have provided at least some information about their characteristics. In the 2012 survey there were 682 such respondents whereas 797 respondents revealed their characteristics in the 2016 survey.

The last part of the questionnaire was intended to collect data about some of the respondents' characteristics: gender, work experience, education level and position in enterprise. Obviously, according to variable gender a respondent can be either male or female. Work experience of respondents is observed as a total number of years that they spent working in the enterprise. Years of working experience in the present enterprise have been taken into account, but in all of the previous ones. Due to many different values, respondents have been classified in three groups. The first group comprises respondents with up to 10 years of work experience, the second one consists of those with 10 to 20 years of work experience, and the third group includes respondents with more than 20 years of work experience. According to the education level, respondents are observed according to the highest finished education level. Overall four education levels have been defined: respondents with finished primary school, respondents with finished secondary school, respondents who got a graduate degree, and respondents who got a master or doctoral degree. Respondents are also going to be observed according to their position in enterprises (a subordinate employee or a superior one). Consequently, three levels are recognized. Respondents who are superior to all employees are observed as top management. It has to be emphasized that in the category of top management owners were included also. Respondents who are in the same time subordinate and superior employee are considered as heads of departments. Respondents who do not have employees under them in the organisation are placed in the group of other employees.

In the analysis of respondents' characteristics, the appropriate statistical tests (like proportion difference statistical test and chi-square test of independence) are going to be used. However, descriptive analysis will be performed before the statistical tests.

Analysis of respondents' characteristics

In the first step the respondents are going to be observed according to the four selected characteristics individually. The distributions of respondents in both surveys according to their characteristics are given in Table 1.

In Table 1 the absolute frequencies of respondents are given, along with their shares given as percentages for each characteristic separately. It has to be emphasized that the absolute number of respondents may not be the same at each characteristic in the observed year. Those differences appeared due to missing data or because respondents did not provide data for all observed characteristics.

Table 1: Distributions of respondents in 2012 and 2016 surveys according to their main characteristics, characteristics of respondents are observed separately

Characteristics of respondents	Categories	2012		2016	
		No. of respondents	% of respondents	No. of respondents	% of respondents
Gender	Male	399	58.50	445	55.83
	Female	283	41.50	352	44.17
Work experience	Up to 10 years	128	18.80	100	12.55
	From 10 to 20 years	273	40.09	271	34.00
	More than 20 years	280	41.12	426	53.45
Education level	Primary school	2	0.29	0	0.00
	Secondary school	143	20.97	159	20.08
	Graduate level	430	63.05	504	63.64
	Master and doctoral level	107	15.69	129	16.29
Position in enterprise	Top management level	429	62.90	531	68.87
	Heads of departments	145	21.26	117	15.18
	Other employees	108	15.84	123	15.95

According to Table 1, more males than female respondents participated in both surveys. However, the 2012 survey had 17 percentage points more males than females, whereas in the 2016 survey the difference decreased to 11.66%. In the surveys, the smallest share had respondents with low work experience level. So, in the 2012 survey share of respondents with up to 10 years of work experience was 18.80%, whereas the share decreased to 12.55% in 2016. In the 2012 survey, shares of respondents with 10 to 20 years of work experience and of respondents with more than 20 years of work experience were quite similar (about 40%). Still, the share of respondents with 10 to 20 years of work experience decreased by about 6 percentage points (to a share of 34%), whereas the share of respondents with more than 20 years of work experience increased by about 12 percentage points (to a share of 53.45%) in 2016. If respondents are observed according to their education level, it can be concluded that there is a negligible number of respondents with only primary school. There were two such respondents in 2012 and none in 2016. The most respondents had a graduate level of education. The share of respondents with a graduate level was 63.05% in 2012 and it changed slightly to 63.64% in 2016. Similarly, there is less than one percentage point difference in shares of respondents with secondary school and of respondents with a master and doctoral level between the 2012 and the 2016 surveys. The vast majority of respondents in the surveys were considered to be at the position of the top management. The share of heads of departments decreased about 6 percentage points from 2012 to 2016 whereas the share of other employees stayed unchanged at share of about 16% in both surveys.

In Table 1 respondents were observed according to only one characteristic at a time. In Table 2 and Table 3 respondents are observed according all four characteristics in the same time. The distribution of respondents taking into account all observed respondents' characteristics for 2012 survey is shown in Table 2 whereas the distribution of respondents related to 2016 survey is given in Table 3. In both tables only respondent categories with a share is larger than 2.5% are emphasized.

According to Table 2, it can be concluded that in the 2012 survey the highest share (14.39%) is attributed to respondents who are males with more than 20 years of work experience, with graduate level and who are positioned as top managers in the enterprises. The second highest share (9.84%) is recorded by respondents who are also males, with graduate level and positioned as top managers in the enterprises but with work experience from 10 to 20 years. Similarly, the respondents with the third highest share (6.61%) share the same characteristics to the respondents with the highest share expect the fact that their highest completed education level is secondary school. The fourth position is held by respondents who are females, with work experience from 10 to 20 years, with graduate level and working at top management level (5.87%). The fifth largest share is held by the category of respondents who are females, with a graduate level and working at top management level also but they have more than 20 years of work experience (3.96%).

Overall 11 groups of respondents have an individual share larger than 2.5%. Those 11 groups account for 59.62% of all respondents in 2012. The rest of 40.38% respondents can be found in other 61 groups of respondents with different characteristics. If only groups with a share higher than 2.5% are observed, it can be concluded that 6 groups (out of the total 11) include respondents who are males, 5 groups of respondents with 10 to 20 years of work experience, 8 groups of respondents who have graduate level and 8 groups of respondents who are at positions of the top management.

Table 2: Distribution of respondents in 2012 survey according to their main characteristics, all characteristics of respondents are observed in the same time

Characteristics of respondents				No. of respondents	% of respondents
Gender	**Work experience**	**Education level**	**Position in enterprise**		
Male	More than 20 years	Graduate level	Top management level	98	14.39
Male	From 10 to 20 years	Graduate level	Top management level	67	9.84
Male	More than 20 years	Secondary school	Top management level	45	6.61
Female	From 10 to 20 years	Graduate level	Top management level	40	5.87
Female	More than 20 years	Graduate level	Top management level	27	3.96
Male	From 10 to 20 years	Secondary school	Top management level	24	3.52
Female	Up to 10 years	Graduate level	Other employees	23	3.38
Female	From 10 to 20 years	Graduate level	Heads of departments	23	3.38
Female	From 10 to 20 years	Graduate level	Other employees	21	3.08
Male	Up to 10 years	Graduate level	Top management level	19	2.79
Male	More than 20 years	Master and doctoral level	Top management level	19	2.79
Other respondents				275	40.38
Total				681	100.00

Notes: Only respondents with a share higher than 2.5% are given in detail in the table. If a respondent did not provide data about all four observed characteristics, such respondent was omitted from the analysis.

Table 3: Distribution of respondents in 2016 survey according to their main characteristics, all characteristics of respondents are observed in the same time

Characteristics of respondents				No. of respondents	% of respondents
Gender	**Work experience**	**Education level**	**Position in enterprise**		
Male	More than 20 years	Graduate level	Top management level	140	18.25
Female	More than 20 years	Graduate level	Top management level	63	8.21
Male	From 10 to 20 years	Graduate level	Top management level	60	7.82
Male	More than 20 years	Secondary school	Top management level	48	6.26
Female	From 10 to 20 years	Graduate level	Top management level	43	5.61
Male	More than 20 years	Master and doctoral level	Top management level	30	3.91
Female	More than 20 years	Graduate level	Heads of departments	27	3.52
Male	From 10 to 20 years	Secondary school	Top management level	25	3.26
Female	More than 20 years	Master and doctoral level	Top management level	22	2.87
Female	From 10 to 20 years	Graduate level	Other employees	21	2.74
Female	From 10 to 20 years	Graduate level	Heads of departments	20	2.61
Other respondents				268	34.94
Total				767	100.00

Notes: Only respondents with a share higher than 2.5% are given in detail in the table. If a respondent did not provide data about all four observed characteristics, such respondent was omitted from the analysis.

Table 3 presents the same set of information as Table 2, but this time for the 2016 survey. As in the 2012 survey, respondents who are males with more than 20 years of work experience, with graduate level and who are positioned as top managers in the enterprises have the highest share in the 2016 survey also (18.25%). The second most frequent category are respondents with the same characteristics except they are females (8.21%). The third and fourth place are held by respondents who have very similar characteristics to the respondents from the first group. In the third place are respondents who are males, with 10 to 20 years of work experience, with graduate level and who are top managers whereas on the fourth place are respondents who are males, with more than 20 years of work experience, with secondary school and who are top managers.

According to Table 3, as in the 2012 survey, overall 11 groups of respondents with share higher than 2.5% can be found in the 2016 survey also. Those 11 groups of respondents include 65.06% of respondents in the 2016 survey. In the 11 emphasized groups of respondents,6 groups of respondents who are females, 6 groups of respondents with more than 20 years of work experience, 7 groups of respondents who have graduate level and 8 groups of respondents who are positioned at the top management level, can be found.

Table 4: Comparing structure of respondents according to main characteristics by conducting two-proportion z-test

Characteristics of respondents	Categories	Difference in proportions (2016 – 2012)	Average proportion	Standard error	Emp. z-value	p-value
Gender	Male	-0.0267	0.5707	0.0258	-1.03	0.3011
	Female	0.0267	0.4293	0.0258	1.03	0.3011
Work experience	Up to 10 years	-0.0625	0.1543	0.0188	-3.32	0.0009*
	From 10 to 20 years	-0.0609	0.3681	0.0252	-2.42	0.0156*
	More than 20 years	0.1233	0.4777	0.0261	4.73	0.0000*
Education level	Primary school	-0.0029	0.0014	0.0019	-1.53	0.1272
	Secondary school	-0.0089	0.2049	0.0211	-0.42	0.6723
	Graduate level	0.0059	0.6336	0.0252	0.23	0.8157
	Master and doctoral level	0.0060	0.1601	0.0192	0.31	0.7546
Position in enterprise	Top management level	0.0597	0.6607	0.0249	2.40	0.0165*
	Heads of departments	-0.0609	0.1803	0.0202	-3.01	0.0026*
	Other employees	0.0012	0.1590	0.0192	0.06	0.9512

Note: *Statistically significant effect at significance level of 5%.

The results of conducted two-proportion z-tests are shown in Table 4. The tests are conducted to inspect if the structure of respondents in the 2016 survey in comparison to the 2012 survey is changed according to each observed characteristic separately. All conducted tests are two-tailed statistical tests where the null hypothesis assumes that there is no difference in shares for each observed characteristic of respondents between the two surveys.

If the changes in the structure of respondents between 2012 and 2016 survey are observed, it can be concluded that the respondents' structure observed according to work experience level is statistically significantly different at the 5% significance level. Furthermore, the conducted statistical tests have shown that the change in the respondents' structure is observed when respondents at top management level and head of departments are observed. The conducted statistical tests, at significance level of 5%, have shown that there is no change in the respondents' structure if they are observed according to their gender or education level.

Table 5: Results of conducted chi-square test of independence of respondents' characteristics in 2012 and 2016 surveys

Observed characteristics of respondents	2012			2016		
	Emp. chi-square value	df	p-value	Emp. chi-square value	df	p-value
Gender vs Work experience	33.691	2	<0.0001*	9.572	2	0.0083*
Gender vs Education level	2.757	2	0.2520	1.033	2	0.5966
Gender vs Position in enterprise	70.606	2	<0.0001*	51.105	2	<0.0001*
Work experience vs Education level	22.600	4	0.0002*	8.945	4	0.0625
Work experience vs Position in enterprise	47.995	4	<0.0001*	77.092	4	<0.0001*
Education level vs Position in enterprise	2.824	4	0.5876	8.643	4	0.0707

Note: Primary school level is omitted from the analysis because there were no respondents in that category (the 2016 survey) or their number was very low (the 2012 survey). *Statistically significant effect at the significance level of 5%.

In order to inspect if respondents' characteristics are independent, chi-square statistical tests have been conducted separately for the 2012 survey and for the 2016 survey. The results of the conducted chi-square statistical tests are shown in Table 5. In each conducted chi-square test the independence of two characteristics of respondents is investigated. The null hypothesis of the chi-square test implies the assumption that two observed variables are independent.

If the chi-square tests results from the 2012 and from the 2016 survey from Table 5 are observed, at the 5% significance level it can be concluded that gender and work experience of respondents are associated. A closer look at the results has shown that female respondents tend to have less work experience than male respondents in both surveys. Furthermore, the chi-square tests results related to both surveys have revealed that, at the significance level of 5%, there seems to be a statistically significant association between gender and position in enterprises of respondents. In-depth analysis has shown that male respondents tend to be on higher positions in

enterprises than female respondents in both surveys. Similarly, at the significance level of 5% it can be concluded that there is a statistically significant association between work experience and position in enterprises of respondents in the 2012 and in the 2016 survey. It seems that respondents with more work experience tend to be on higher positions in enterprises.

On the other side, the chi-square test results have shown, at the significance level of 5%, that there is no association between gender and education level of respondents in the observed surveys. The same conclusion can be drawn for the education levels of respondents and their positions in enterprises.

If work experience and education level of respondents are observed, it can be concluded that they are associated at the significance level of 5%. However, this conclusion is valid only if the 2012 survey is observed, whereas those two characteristics of respondents do not seem to be associated if data from 2016 are used. Furthermore, the explanation of the association effect in the 2012 survey is not straightforward. Namely, the number of respondents with secondary school increases with increase of the work experience levels. On the other side, other two education levels have reached the highest number of respondents at the 10 to 20 years of work experience level.

Conclusions

In order to successfully conduct a survey which is going to result in a good response rate and with good quality data, it is necessary to know at least something about your respondents. When a researcher knows some characteristics of respondents, he can make certain adjustments and improvements in the survey process like using different phrases in the questionnaire to ask questions or using different survey mode or approach.

In this paper, characteristics of respondents in two business web surveys, conducted in 2012 and in 2016, were observed. The topic and the questionnaire was the same in both surveys. According to similar previous research, which are described in the Introduction, respondents should be males with low work experience and with an, at least, graduate level degree. However, the profile of respondents, who participated the most in the web surveys, turned out to be somewhat different than expected. Because of that the research hypothesis of the paper was rejected. The largest difference appeared when work experience level of respondents is observed. Namely, it has been shown that here in the business web surveys only 18.80% respondents in the 2012 survey had up to 10 years of work experience whereas the share of such respondents decreased to 12.55% in the 2016 survey.

The main limitation of the paper is the fact that only two web surveys have been observed. In the future research characteristics of enterprises that participated in the web survey should be inspected also.

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