RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS
No. 85 — 2009
Advanced Information Technologies for Management – AITM 2009

Mirosław Dyczkowski

Wrocław University of Economics, Wrocław, Poland
e-mail: miroslaw.dyczkowski@ue.wroc.pl

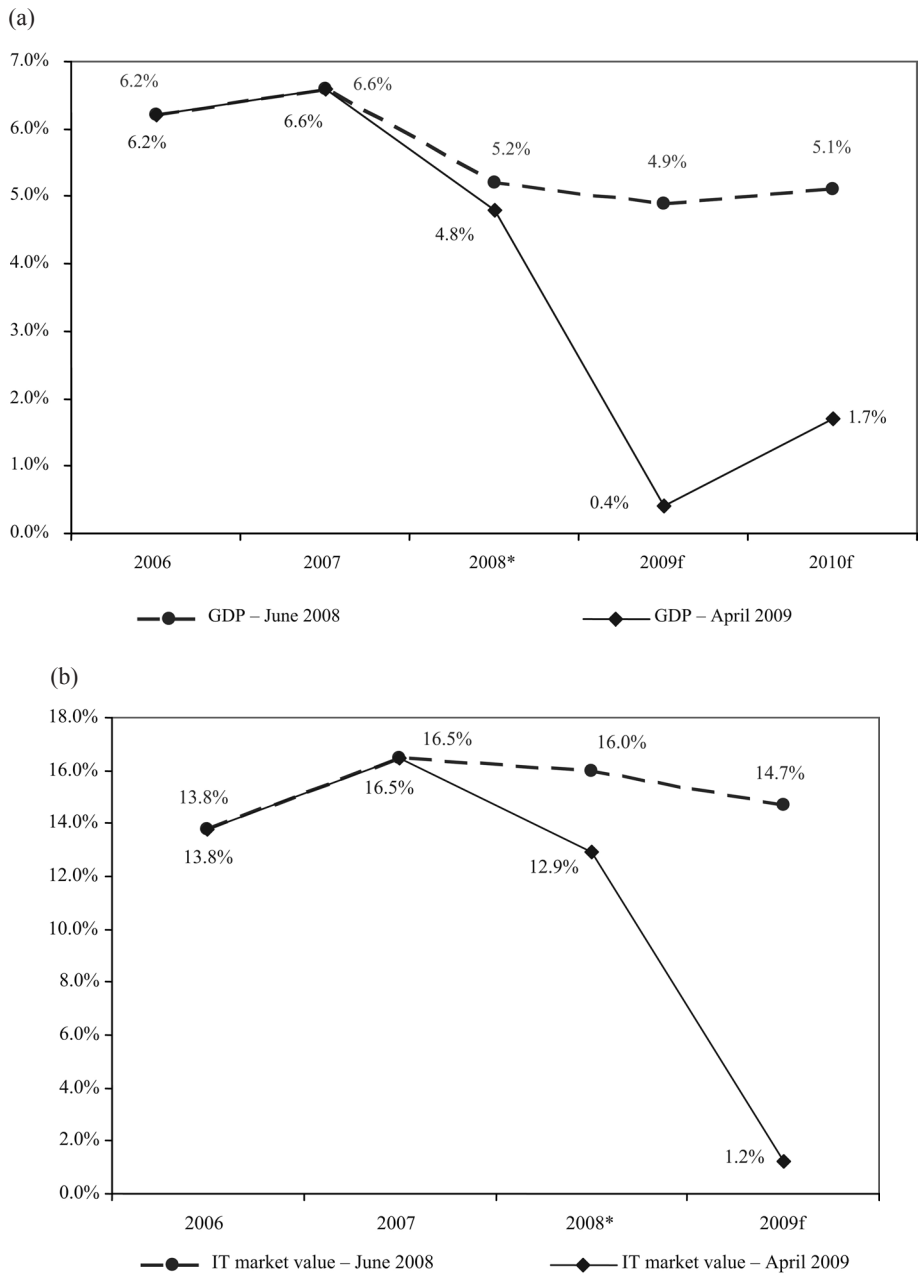
ECONOMIC CRISIS AND INFORMATISATION STRATEGIES OF ENTERPRISES. RESULTS OF A SURVEY WITH A FOCUS ON SME SECTOR

Abstract: The paper discusses results of a survey – carried out in April-May 2009 – which aimed at analysing how the recent economic crisis influenced informatisation strategies of enterprises. The initial part presents assumptions for the research project. It is followed by multidimensional statistical analysis of 139 collected sets of data. The results obtained support a working hypothesis that the economic crisis affected – to smaller or greater extent – short- and long-range informatisation strategies in the majority of companies or institutions. The visible signs of that situations include: decreasing budgets and employment in IT departments, limited spendings on IT investments, reduced scopes of ongoing projects, postponed or suspended IT investments, abandoned investment plans, or substantial cuts in seminars and trainings related to information technology.

1. Introduction

The global financial crisis, which has affected the Polish economy since the second half of 2008, resulted in deteriorating economic situation in majority of companies and institutions. Evidence was provided by: current business statistics, economic and social analyses, or by monitoring changes of tendency in the economy. Implications of the crisis were also observed in information technology domain. Clear signals came from producers and providers of IT products and services, as well as from their customers. They were also acknowledged by nearly all major companies monitoring IT industry, including: DiS, Gartner, Forrester Research, IDG or PMR, which issued revised market forecasts in the first half of 2009. The report of PMR, entitled *Revision of forecasts for IT markets in Poland, Russia and Ukraine* [Olszynka 2009a] (presented in Figures 1a and 1b), may serve as an example here.

In order to gather more information on the discussed subject, the author of this paper carried out a survey in April and May 2009. It was designed to assess an impact of the economic crisis on informatisation strategies and IT projects in selected companies and institutions. The survey followed the author's main research projects,



* forecast estimate respectively, f – forecast

Figure 1. Year-on-year rate of change of GDP (a) and IT market value (b) in Poland (%), according to PMR data and forecasts as of June 2008 and April 2009, 2006-2010

Source: own presentation based on [Olszynka 2009a, p. 4].

including analytical and diagnostic studies on: current status and changes in Polish IT project management practices, IT projects assessment (with focus on effectiveness), or key success factors for IT projects. Research methodology, data collected and results obtained were presented at numerous specialised, nationwide and international conferences. They were also published in several papers and research reports[1].

This paper presents various data breakdowns and analyses which help to assess an impact of the economic crisis on informatisation strategies. The attention will be paid to small and medium-sized enterprises (SMEs) in particular – due to their importance to the Polish economy.

2. Assumptions for the study

The selection of the study area follows the author's conviction that awareness of ways in which business organisations and institutions respond to the economic crisis (with the focus on IT-related activities) is important in order to counteract effects of the crisis more effectively. Such knowledge should enable the IT industry to get back on track of dynamic growth observed in recent years (see Figure 1b) much quicker, which is essential when considering long-range strategies for developing e-society and e-economy in our country. For the author – an academic – the information collected, beside its cognitive and utilisable aspects, has a certain educational value (both in didactic and in advisory or consulting activities).

The study has an interregional reach, and reflects situation of companies and institutions located mostly in Warsaw (Mazovia) or in Wrocław (Lower Silesia). The survey was carried out by students of postgraduate managerial programme "IT Projects Management" at the Faculty of Management of the Warsaw University, and by part-time master-level students of Information Technology and Econometrics at the Faculty of Management, Computer Science and Finance of the Wrocław University of Economics. The aforementioned groups of students were selected for the following reasons.

First of all, they were employed in majority as IT personnel of various companies and institutions. Moreover, they were often holding positions (such as: heads or managers in IT departments, senior IT specialists, IT consultants, managers or company owners) which entitled them to influence informatisation strategies in reaction to market moves. In other cases they at least had an access to required information and were directly or indirectly affected by decisions regarding informatisation strategies of the surveyed companies or institutions.

Secondly, the foregoing groups participated in seminars – held by the author – concerning effective and efficient informatisation and effective IT management. During the seminars the students were provided with fundamental knowledge on "best practices" in generating value by IT for companies and institutions as well

[1] See for example [Dyczkowski 2005, 2006a, b, c, 2007a, b, 2008].

as on standards in efficient and effective IT product development and IT services provision for businesses. Familiarity with those issues was helpful in conducting the survey, both at the stage of filling in questionnaires and in initial interpretation of collected data. It was also important from the educational point of view, as the students could verify skills acquired during their studies in practice.

The study was carried out in April and May 2009 – as already mentioned in the introduction. The selection of that period resulted to some extent from a schedule of the academic year, yet, the far more important reason was the author's conviction – substantiate by other sources – that at that time forecasts drawn up at the turn of 2008 and 2009 were modified, and already incorporated information on crisis development, figures from financial statements of 2008 and data from closing reports of the first quarter of 2009. The companies and institutions reflected newest data in their strategies, including those of IT area, by either sticking to or modifying prior plans.

The overall number of collected – and duly filled in – questionnaires amounted to 139, 52 of which were delivered by students from Warsaw, and 87 by students from Wroclaw. All questionnaires formed a repository of 139 sets of data, each comprising: 38 quantitative and qualitative characteristics describing how the economic crisis affected IT strategies and what changes in strategies were adopted, 6 descriptive and typological features of the surveyed objects, and 5 other which allowed to verify collected data (including sources of information). The repository is stored and proceeded in two file formats: primarily as workbooks of Statistica, and secondly as MS Excel files. The repository contains data on a very diverse group of companies and institutions, therefore a detailed presentation of that group is required.

3. General characteristics of the surveyed objects

Before selected results of the study are discussed, the surveyed objects – companies and institutions – will be presented briefly. Table 1 presents a breakdown of examined objects by their areas of operations and sizes. It includes: number of objects in particular clusters, importance of clusters in the whole sample (percentage in square brackets), and dominating values (cells shaded in grey).

The information presented in Table 1 requires short comment. Considering areas of operation, the category "other" prevails (53.24% of answers), what was a consequence of professional profiles of students who carried out the survey. This group included mostly IT companies (58.67%) but also telecommunication ones (10.67%). This means that the ICT industry amounted in total to 69.33% of objects belonging to the category "other sector".

With regard to size, similar shares of objects belonging to: small, medium-sized, large and the largest enterprises can be noticed (20.14-24.46%). A number of microenterprises was relatively smaller (11.51% of the sample). The situation differs slightly from sector to sector, in particular in case of financial institutions dominated by the largest objects (54.55% of that sector). The author is aware that the sample reflects neither sector- nor size-related profiles of the Polish economy.

Table 1. Structure of the surveyed objects by sector and size

Sector	Object size (number [%])[2]					Total
	micro	small	medium	large	the largest	
Public administration	0 [0.00]	1 [0.72]	4 [2.88]	3 [2.16]	6 [4.32]	14 [10.07]
Banking, finance, insurance	0 [0.00]	0 [0.00]	2 [1.44]	3 [2.16]	6 [4.32]	11 [7.91]
Commerce (commodity trade)	4 [2.88]	7 [5.04]	5 [3.60]	3 [2.16]	2 [1.44]	21 [15.11]
Other	12 [8.63]	18 [12.95]	17 [12.23]	16 [11.51]	11 [7.91]	74 [53.24]
Industry	0 [0.00]	2 [1.44]	6 [4.32]	7 [5.04]	4 [2.88]	19 [13.67]
Total	16 [11.51]	28 [20.14]	34 [24.46]	32 [23.02]	29 [20.86]	139 [100.00]

Source: own presentation based on data from the survey.

Table 2 links industry profiles with informatisation levels in the surveyed objects. The latter feature was quantified by describing to what extent IT solutions support processes in such areas as: core business, administration and office work or other activities. It can be noticed (see shaded cells) that the surveyed objects (76.26% of them) were characterised by high or very high values of that parameter. This stemmed from the industry profile of the sample, and in particular from the biggest share of ICT companies – where business operations are generally computerised. One has to realise also that assessments of informatisation level were prone to subjectivity.

Table 2. Structure of the surveyed objects by sector and informatisation level

Sector	Informatisation level (number [%])						Total
	very low (< 30%)	low (≥ 30%)	some (≥ 45%)	medium (≥ 60%)	high (≥ 75%)	very high (≥ 90%)	
Public administration	0 [0.00]	1 [0.72]	2 [1.44]	6 [4.32]	2 [1.44]	3 [2.16]	14 [10.07]
Banking, finance, insurance	0 [0.00]	0 [0.00]	0 [0.00]	1 [0.72]	7 [5.04]	3 [2.16]	11 [7.91]
Commerce (commodity trade)	0 [0.00]	0 [0.00]	3 [2.16]	3 [2.16]	8 [5.76]	7 [5.04]	21 [15.11]
Other	1 [0.72]	1 [0.72]	1 [0.72]	10 [7.19]	18 [12.95]	43 [30.94]	74 [53.24]
Industry	0 [0.00]	0 [0.00]	1 [0.72]	3 [2.16]	12 [8.63]	3 [2.16]	19 [13.67]
Total	1 [0.72]	2 [1.44]	7 [5.04]	23 [16.55]	47 [33.81]	59 [42.45]	139 [100.00]

Source: own presentation based on results of the survey.

[2] Sizes of institutions were determined in a simplified manner, and considered number of employees only. However, classification criteria comply with both national (GUS) and European statistic systems (Eurostat).

Table 3, in turn, compares industrial profiles of the examined objects with assessments of an impact of the crisis on their economic situation. The assessments were based on a 5-grade scale, but as none of the companies or institutions declared that their economic situation was "much better" than before the crisis, this answer was excluded from the breakdown. Considering information presented in Table 3, it can be noticed (see shaded cells) that the most frequent response was that a situation of an object became "slightly worse" (51.8% of all the answers). Nevertheless, the significant share (32.37%) of responses suggested a stable economic position. The situation of the public administration and of "other" sectors – the most important from the author's point of view – appeared the most favourable. The latter cluster is characterised by the highest share of neutral or positive assessments (45.95%). The number of companies indicating that their situation improved slightly, is the highest in this group, as well.

Table 3. Structure of the surveyed objects by sector and by impact of the crises on their economic situation

Sector	Impact of the crisis on economic situation of an object (number [%])				Total
	is much worse	is slightly worse	nothing has changed	is slightly better	
Public administration	0 [0.00]	7 [5.04]	7 [5.04]	0 [0.00]	14 [10.07]
Banking, finance, insurance	3 [2.16]	5 [3.60]	3 [2.16]	0 [0.00]	11 [7.91]
Commerce (commodity trade)	2 [1.44]	12 [8.63]	6 [4.32]	1 [0.72]	21 [15.11]
Other	4 [2.88]	36 [25.90]	23 [16.55]	11 [7.91]	74 [53.24]
Industry	0 [0.00]	12 [8.63]	6 [4.32]	1 [0.72]	19 [13.67]
Total	9 [6.47]	72 [51.80]	45 [32.37]	13 [9.35]	139 [100.00]

Source: own presentation based on results of the survey.

Having considered the basic characteristics of the objects, for which data were successfully collected, the following parts of the paper will analyse influence of the economic crisis on informatisation strategies, which is the major point of interest of this publication.

4. Assessing influence of the economic crisis on informatisation strategies

4.1. Results for the entire surveyed group

The results of the analysis and assessments on how the economic crisis affected informatisation strategies will be presented in the following sequence. In the begin-

ning it will be examined whether, and if yes – to what extent, informatisation strategies were modified, firstly, in particular industries (Table 4), secondly, in objects of certain sizes (Table 5), and thirdly, in objects distinguished according to informatisation levels (Table 6). Subsequently, it will be analysed in what ways changes in economic situation of companies influenced their informatisation strategies and ongoing IT projects (Table 7). Finally, the most important symptoms of changes in informatisation strategies will be indentified and depicted in reference to the whole analysed group (Figure 2) and to those object only where IT strategies were modified (Figure 3).

Table 4. Influence of the economic crisis on informatisation strategies and projects in the surveyed objects according to sectors

Sector	Influence of the economic crisis on IT strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
Public administration	4	2.88	9	6.47	1	0.72	14	10.07
Banking, finance, insurance	2	1.44	6	4.32	3	2.16	11	7.91
Commerce (commodity trade)	7	5.04	12	8.63	2	1.44	21	15.11
Other	29	20.86	40	28.78	5	3.60	74	53.24
Industry	9	6.47	10	7.19	0	0.00	19	13.67
Total	51	36.69	77	55.40	11	7.91	139	100.00

Source: own presentation based on results of the survey.

Table 5. Influence of the economic crisis on informatisation strategies and projects in the surveyed objects according to sizes

Object size	Influence of the economic crisis on IT strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
Micro	6	4.32	9	6.47	1	0.72	16	11.51
Small	12	8.63	15	10.79	1	0.72	28	20.14
Medium	8	5.76	23	16.55	3	2.16	34	24.46
Large	17	12.23	13	9.35	2	1.44	32	23.02
The largest	8	5.76	17	12.23	4	2.88	29	20.86
Total	51	36.69	77	55.40	11	7.91	139	100.00

Source: own presentation based on results of the survey.

Table 6. Influence of the economic crisis on informatisation strategies and projects in the surveyed objects according to informatisation levels

Informatisation level	Influence of the economic crisis on IT strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
Very low (< 30%)	1	0.72	0	0.00	0	0.00	1	0.72
Low (≥ 30%)	2	1.44	0	0.00	0	0.00	2	1.44
Some (≥ 45%)	3	2.16	3	2.16	1	0.72	7	5.04
Medium (≥ 60%)	6	4.32	16	11.51	1	0.72	23	16.55
High (≥ 75%)	18	12.95	25	17.99	4	2.88	47	33.81
Very high (≥ 90%)	21	15.11	33	23.74	5	3.60	59	42.45
Total	51	36.69	77	55.40	11	7.91	139	100.00

Source: own presentation based on results of the survey.

Table 7. Crisis-related changes in economic situation of the surveyed objects and their influence on informatisation strategies and projects

Influence of crisis on economic situation of the objects	Influence of changes in economic situation on informatisation strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
It is much worse	1	0.72	2	1.44	6	4.32	9	6.47
It is slightly worse	14	10.07	54	38.85	4	2.88	72	51.80
Nothing has changed	29	20.86	15	10.79	1	0.72	45	32.37
It is slightly better	7	5.04	6	4.32	0	0.00	13	9.35
Total	51	36.69	77	55.40	11	7.91	139	100.00

Source: own presentation based on results of the survey.

The data presented in Tables 4-7 require short comment. First of all, the study showing that as much as 63.31% of the surveyed objects adjusted their informatisation strategy and IT projects in the result of the crisis (55.40% slightly and 7.91% in a radical way) supports results of similar analyses carried out in 2009. For example, the study conducted by IDG in March showed that 63.16% of the polled were of the opinion that the crises would influence IT industry (see [*Czy obecny kryzys*... 2009]). The report of PMR issued in April (see [Olszynka 2009a]) claimed that 76% of IT managers found acute worsening of economic situation in Poland and in the world the major restraint to increase of the local IT market, whereas 88% believed that some segments of the market would negatively respond to the crisis. Secondly, the data collected show that influence of the crisis on informatisation strategies and IT projects was to the limited extent related to a sector where the objects operated

(see the shaded range in Table 4). Thirdly, the similar conclusion may be drawn in reference to a relation between the crisis and size of an object (see shaded cells in able 5). However, a different pattern can be observed in the group of objects classified as "large". The fourth conclusion is that an impact of the crisis on informatisation strategies and IT projects is more visible among objects characterised by higher level of informatisation (see shaded range in Table 6). Nevertheless, the changes were recognised as "slight". Finally – as expected – a scope of adjustments in informatisation strategies and in IT projects was correlated with a magnitude of change in economic situation of an object (see shaded cells in Table 7).

The data collected in the study enabled also to identify and structure major symptoms of changes in informatisation strategies and in IT projects, which were adopted in the result of the crisis. It should be added that these symptoms were identified by the surveyed objects with a help of a predefined list. The list was open, nevertheless, only 6 out of 139 objects pointed out other reasons than defined. By compiling the list, the author considered various studies (including [Jaślan 2009; Kosowska 2008; Olszynka 2009a, b; *Rynek IT boleśnie*... 2009; Waszczuk 2009a, b; Wolak 2009]) and selected the following symptoms (the descriptions and their order matches those used in questionnaires or in Figures 2 and 3):

1) a budget of an IT department was reduced,
2) spendings related to IT investments decreased,
3) new projects were abandoned,
4) ongoing projects were stopped,
5) a scope of projects was reduced,
6) IT investments were postponed,
7) IT services outsourcing was intensified,
8) IT personnel was made redundant,
9) number of IT seminars and trainings dropped,
10) IT was financed with external sources,
11) IT costs were streamlined (using TCO),
12) other.

The surveyed objects were asked to point to all relevant symptoms. The following figures present structures of responses in the whole analysed group (Figure 2) and in reference to those objects only where changes in informatisation strategies – either slight of radical – took place (Figure 3).

In reference to data depicted by Figure 2 it should be noticed that the surveyed objects declared the following symptoms of informatisation strategy changes the most frequently (they appeared in over 20% of questionnaires): reduced number of IT seminars and trainings (33.09% of questionnaires), decreasing spendings on IT investments (30.94%), reduced budgets of IT departments (25.90%) and postponed IT investments (20.86%). Relatively high share (15.83%) of answers declaring cost streamlining initiatives is also worth mentioning, since it is a proof that awareness of this issue has recently heightened. The author finds this information particularly

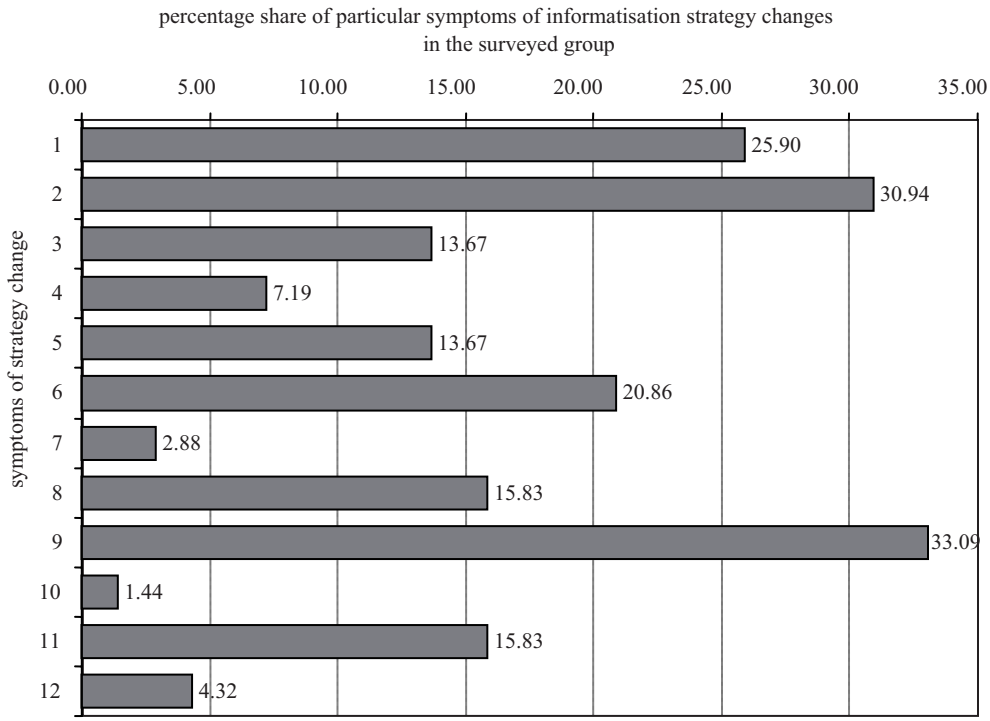


Figure 2. The structure of identified symptoms of informatisation strategy changes for the entire group of objects

Source: own presentation based on results of the survey.

important, as efficient application of information technologies has been promoted by him for many years. The low significance of IT services outsourcing (only 2.88%) along with limited external financing (1.44%) are unpleasant surprises. In particular the latter figure is disappointing, considering significant funds for fostering innovations (including ICT) available within particular EU and nationwide financial support frameworks. The results obtained in the group of organisations which declared changes in their informatisation strategies were similar, and differed only – what is obvious – in percentage levels (see Figure 3).

Apart from identifying symptoms of informatisation strategy changes, the study covered also quantitative and monetary characteristics which reflected "intensity" of such changes[3]. Among the objects which modified their informatisation strategies the most significant decreases were observed in: IT investment budgets (61.36%

[3] This part of the questionnaire used a 5-grade scale of quantitative and monetary assessments. The surveyed objects declared "intensity" of particular symptoms as: "substantial decrease", "decrease", "no changes", "increase", "substantial increase".

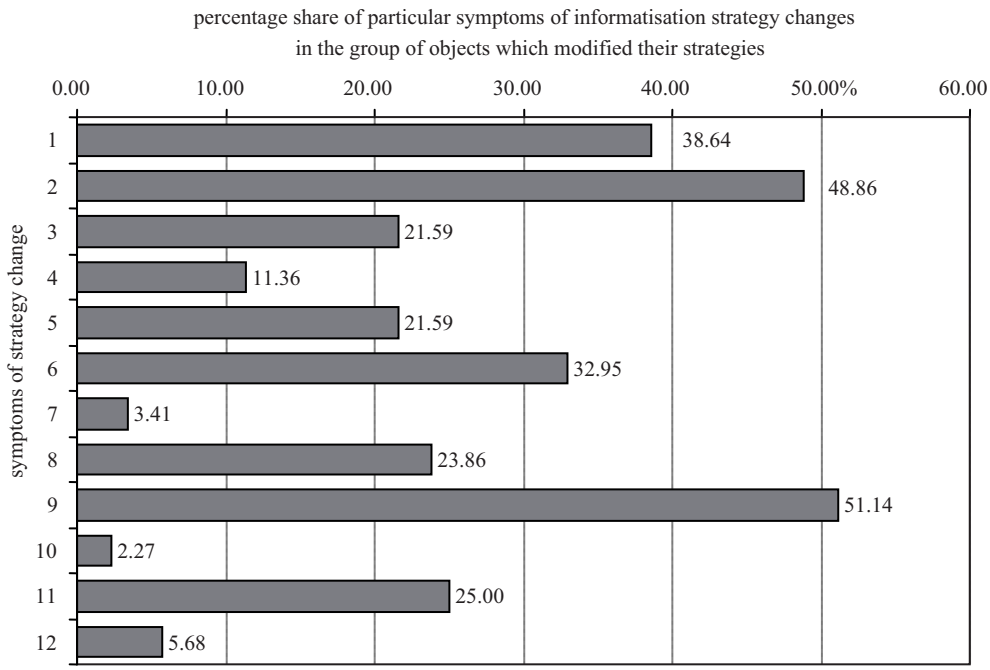


Figure 3. The structure of identified symptoms of informatisation strategy changes for the objects which modified their strategies

Source: own presentation based on results of the survey.

of answers indicated "decrease" or "substantial decrease"), seminars and trainings (59.09%), equipment purchases for IT departments (53.41%) and current spendings on IT (51.14%). Only in case of own projects, carried out by IT departments, a noticeable growth could be observed (20.45% of answers indicated "increase" or "substantial increase"). In other areas such indications did not exceed 10%-level. It may be assumed that companies in search for cost cuts resigned, to some extent, from services of external consultants and decided to complete essential projects with resources of internal IT personnel.

The data collected in the study enables also to identify IT domains affected by modifications in informatisation strategies and to characterise such changes in quantitative and monetary ways. Among those objects which adjusted informatisation strategies, the most significant decreases were observed in the following areas: purchases/stock management/supply chain, supported by SCM applications (34.09% of answers indicated "decrease" or "substantial decrease"), and in information systems, where MIS/EIS applications are used (26.14%). Interestingly, the latter group was one of the two characterised by the biggest growth (15.91% of answers indicated "increase" or "substantial increase"). The other one comprised marketing information systems of CRM class (14.77%). This leads to a conclusion that in times

of crisis companies hesitated whether they should cancel or intensify projects employing more sophisticated IT solutions.

Concluding discussion on changes in informatisation strategies in reference to the whole examined sample, it should be added that the material collected enabled to distinguish certain subsets of objects which can be further examined. The next chapter will therefore present an analysis focused on a sector of small and medium-sized companies.

4.2. Results for the small and medium-sized companies

As mentioned in the introduction, the importance of small and medium-sized companies to the Polish economy was a decisive factor for paying more attention to this group in this paper. Due to high share of SMEs in the surveyed group (78 out of 139, i.e. 56.12%) selection of this subset for further analysis was not only possible but also statistically valid. Even though the composition of the sample did not reflect the structure of the Polish economy, a variance for the SMEs cluster was much lower than in case of large and the largest companies.

Presentation of the results of the analysis and assessments of influence of the economic crisis on informatisation strategies in SME sector will proceed in the same way as for the whole sample (see Section 4.1). At the beginning major characteristic of SMEs will be analysed, in more detailed manner than in Section 3, though.

The data in Table 8 show high informatisation level for the SME sector (70.51% of objects selected the answers: "high" or "very high"). Nevertheless, this level is slightly lower than the one for the whole sample (see Table 2). The assessment presented in Table 9 shows, in turn, that the economic crisis affected SME sector less severely than large and the largest companies (55.13% of SMEs indicated "slight" or "substantial" deterioration here, with 62.30% share for large and the largest companies).

Table 8. Size and an informatisation level of the surveyed SMEs

Informatisation level	Object size						Total	
	micro		small		medium			
	number	[%]	number	[%]	number	[%]	number	[%]
Very low (< 30%)	1	1.28	0	0.00	0	0.00	1	1.28
Low (≥ 30%)	1	1.28	0	0.00	0	0.00	1	1.28
Some (≥ 45%)	1	1.28	4	5.13	1	1.28	6	7.69
Medium (≥ 60%)	1	1.28	5	6.41	9	11.54	15	19.23
High (≥ 75%)	5	6.41	4	5.13	12	15.38	21	26.92
Very high (≥ 90%)	7	8.97	15	19.23	12	15.38	34	43.59
Total	16	20.51	28	35.90	34	43.59	78	100.00

Source: own presentation based on results of the survey.

Table 9. Size and influence of the crisis on economic situation of SMEs

Influence of the crisis on economic situation of an object	Object size						Total	
	micro		small		medium			
	number	[%]	number	[%]	number	[%]	number	[%]
It is much worse	2	2.56	1	1.28	3	3.85	6	7.69
It is slightly worse	10	12.82	11	14.10	16	20.51	37	47.44
Nothing has changed	2	2.56	12	15.38	12	15.38	26	33.33
It is slightly better	2	2.56	4	5.13	3	3.85	9	11.54
Total	16	20.51	28	35.90	34	43.59	78	100.00

Source: own presentation based on results of the survey.

Table 10. Influence of the economic crisis on IT strategies and projects in the surveyed SMEs according to their sizes

Influence of the crisis on informatisation strategies and projects	Object size						Total	
	micro		small		medium			
	number	[%]	number	[%]	number	[%]	number	[%]
No change	6	7.69	12	15.38	8	10.26	26	33.33
Slight change	9	11.54	15	19.23	23	29.49	47	60.26
Radical change	1	1.28	1	1.28	3	3.85	5	6.41
Total	16	20.51	28	35.90	34	43.59	78	100.00

Source: own presentation based on results of the survey.

Table 11. Influence of the economic crisis on IT strategies and projects in the surveyed SMEs according to informatisation levels

Informatisation level	Influence of the economic crisis on IT strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
Very low (< 30%)	1	1.28	0	0.00	0	0.00	1	1.28
Low (≥ 30%)	1	1.28	0	0.00	0	0.00	1	1.28
Some (≥ 45%)	3	3.85	2	2.56	1	1.28	6	7.69
Medium (≥ 60%)	4	5.13	11	14.10	0	0.00	15	19.23
High (≥ 75%)	7	8.97	13	16.67	1	1.28	21	26.92
Very high (≥ 90%)	10	12.82	21	26.92	3	3.85	34	43.59
Total	26	33.33	47	60.26	5	6.41	78	100.00

Source: own presentation based on results of the survey.

Considering additional information on the surveyed SMEs, it may be examined whether, and – if yes – to what extent, these companies have modified their informatisation strategies and IT projects – firstly, within groups distinguished by size (Table 10), and secondly, at certain informatisation levels (Table 11). Subsequently, it will be analysed in which ways changes in economic situation of companies influenced their informatisation strategies and ongoing IT projects (Table 12). Finally, a structure of the most important symptoms of changes in informatisation strategies will be detected and depicted in reference to the whole SME cluster (Figure 4) and to those objects only where IT strategies were changed (Figure 5).

Table 12. Crisis-related changes in economic situation of the surveyed SMEs and their influence on informatisation strategies and projects

Influence of crisis on economic situation of an object	Influence of crisis on informatisation strategies and projects							
	no change		slight change		radical change		Total	
	number	[%]	number	[%]	number	[%]	number	[%]
It is much worse	1	1.28	1	1.28	4	5.13	6	7.69
It is slightly worse	7	8.97	30	38.46	0	0.00	37	47.44
Nothing has changed	14	17.95	11	14.10	1	1.28	26	33.33
It is slightly better	4	5.13	5	6.41	0	0.00	9	11.54
Total	26	33.33	47	60.26	5	6.41	78	100.00

Source: own presentation based on results of the survey.

The data presented in Tables 10-12 require brief comment. First of all, small and medium-sized companies modified their informatisation strategies and IT projects in result of the crisis more often than other surveyed objects (66.67% for SMEs, with 63.31% for the whole sample and 59.02% for large and the largest companies). Adjustments were introduced by medium-sized companies the most frequently (in 76.47% of cases). Secondly, the crises affected informatisation strategies and IT projects of the companies characterised by higher informatisation levels more often than in case of other objects (see shaded range in Table 11), even though these were usually "slight" changes. Thirdly, the SMEs – like other surveyed objects – demonstrated correlation between magnitude of changes in their economic situation and modifications in informatisation strategies and IT projects (see shaded cells in Tables 7 and 12).

With regard to data depicted by Figure 4, it should be noticed that the surveyed SMEs declared the following symptoms of informatisation strategy changes the most frequently (in over 20% of cases): decreasing spendings on IT investments (30.77% of questionnaires), reduced budgets of IT departments (25.64%), reduced number of IT seminars and trainings (23.08%), redundancies in IT personnel (21.79%) and postponed IT investments (20.51%). The results obtained for these SMEs which

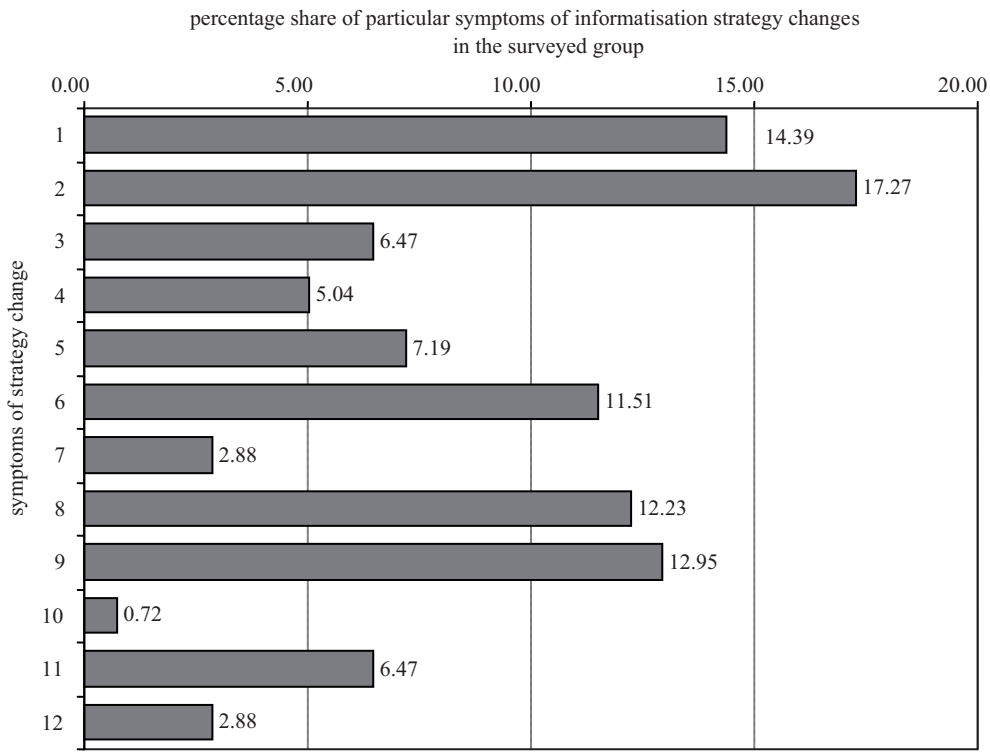


Figure 4. The structure of identified symptoms of informatisation strategy changes in SME sector

Source: own presentation based on results of the survey.

declared changes in their informatisation strategies were similar, and differed only – what is obvious – in percentage levels (see Figure 5). It must be also added that both lists differ – in their composition, order and percentage levels – from those referring to the whole analysed group (see Figures 2 and 3, and the comments).

Among SMEs which modified their informatisation strategies the most significant decreases were observed in: IT investment budgets (57.69% of answers indicated "decrease" or "substantial decrease"), equipment purchases for IT departments (55.77%) and current spendings on IT (51.92%). Just as for the whole surveyed group, only in case of own IT projects a noticeable growth could be observed (23.08% of answers indicated "increase" or "substantial increase"). In other areas such indications did not exceed 10%-level. Considering IT applications affected by changes in informatisation strategies the most noticeable decreases, for the SMEs which modified their IT strategies, were observed in the following domains: purchases/stock management/supply chain – that is in case of SCM applications (28.85% of answers indicated "decrease" or "substantial decrease"), information systems – that is in case of MIS/EIS software (25.00%) as well as in sales/distribution (23.08%).

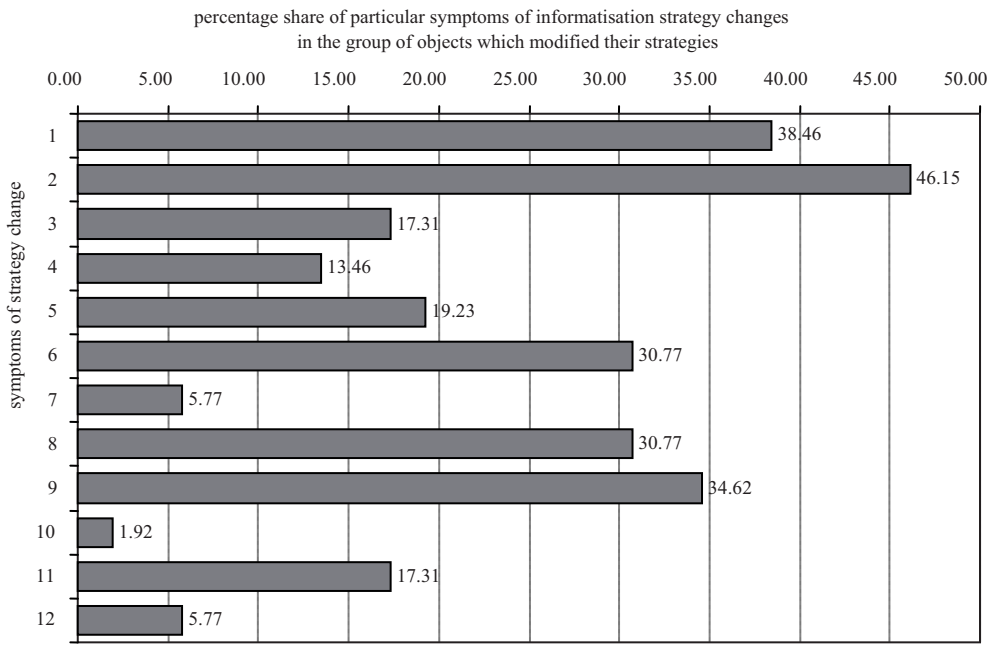


Figure 5. The structure of identified symptoms of informatisation strategy changes for SMEs which modified their strategies

Source: own presentation based on results of the survey.

The biggest growth was observed in case of marketing information systems of CRM class (21.15% of answers indicated "increase" or "substantial increase") and in case of MIS/EIS applications (17.31%) – mentioned also among most negatively affected areas. This leads to a conclusion that in times of crisis small- and medium-sized companies had to face a dilemma whether they should cancel or intensify such projects.

5. Main conclusions

The selected results of analysis of data collected in the survey carried out in April and May 2009, with a focus on an impact of the economic crisis on informatisation strategies and IT projects, entitle to formulate the following conclusions.

Firstly, the results supported a working hypothesis that the economic crises did affect, to smaller or greater extent, long- and short-term informatisation strategies in most of the examined objects. Observed modifications in IT strategies (in 63.31% of all the surveyed objects, in 66.67% of SMEs, and in 59.02% of large and the largest companies) are the most evident indicator of this situation. In majority, though, the adjustments had a limited scope. The answer "there was a slight change in the

informatisation strategy" was chosen by 87.50% of the surveyed objects, including 90.38% of SMEs and 83.33% of large and the largest companies, which declared modifications in their informatisation strategies. The results obtained indicated that SMEs responded to the crises by redefining activities in the IT area quicker and to the larger extent than other objects, which is characteristic of this sector.

Secondly, the observed frequency and magnitude of changes in IT strategies was – as expected – correlated with informatisation level, in reference both to the whole sample (see Table 6) and to the SME sector (see Table 11). The major symptoms of IT strategy and projects modifications were similar for both groups. They included (see Figures 2 and 4): reduced scope of IT seminars and trainings (by 33.09% for the whole surveyed group and by only 21.79% for the SME sector – where this was a fourth top signal), decreased spending on IT investments (30.94% and 30.77% respectively), reduced budgets of IT departments (25.90% and 25.64% respectively) and postponed IT investments (20.86% and 20.51% respectively). Two important differences between the entire sample and SME subset were observed, though. Redundancies in IT personnel, common for the SMEs (23.08% of answers – third position), were far less relevant for the whole sample (15.83% and 5th-6th position). On the other hand, IT cost streamlining, quite important for the entire group, and even more in case of large and the largest companies (15.83% and 5th-6th position) was not so common among SMEs (11.54% and 7th-8th position).

Thirdly, restricting analysis to those objects only which modified their informatisation strategies due to the crisis, the most important decreases – in quantitative and monetary terms – were observed in case of: IT investment budgets (61.36% of answers indicated "increase" or "substantial increase" for the entire group, and 57.69% in the SME sector), equipment purchases for IT departments (53.51 and 55.77% respectively) and current spendings on IT (51.14 and 51.92% respectively). The difference can be observed in reference to IT seminars and trainings, where substantial decrease in the whole group (59.09% – second position), and even more rapid decline among large and the largest enterprises, was not followed by the SMEs sector (40.38%, which is less significant than "equipment purchases for end-users", equal to 42.31%). Lower expenses of the SME sector related to seminars and training, even in times of prosperity, account for that difference.

The fourth conclusion is that own projects carried out by IT departments were the only area of growth (in other domains a 10%-level was not exceeded), where 20.45% of all the surveyed objects and 23.08% of the SMEs indicated "increase" or even "substantial increase". This means that companies looking for cost cuts resigned, to some extent, from offers of external consultants and decided to continue key projects with their own resources.

Finally, considering applications of information technologies affected by changes in informatisation strategies, the most important modifications – in those objects which decided to verify their IT policy – included: purchases/stock management/supply chain – and consequently SCM applications (34.09% of answers indicated

"decrease" or "substantial decrease" for the whole group, and 28.85% in the SME sector) and in information systems – that is in case of MIS/EIS applications (26.14 and 25.00% respectively). The latter group was the one which experienced the biggest growth (15.91% of answers indicated "increase" or "substantial increase" for the whole group, and 17.31% in the SME sector). The second area of increase in number of projects and spendings included marketing information systems of CRM type (increase of 14.77% in the entire group, and 20.15% in the SME sector). This situation suggests that despite crisis companies debated whether they should abandon or intensify such projects.

The author believes that by observing behaviour of companies and institutions and their responses to the economic crisis in IT domain, the following two objectives were achieved. On the one hand, the findings presented in other reports and analyses were confirmed and supplemented, and on the other – due to new pieces of evidence gained – negative consequences of crisis in IT area may be effectively counterbalanced. All these should, at least indirectly, lead to achieve goals of long-range strategies for developing e-society and e-commerce in Poland, both more effectively and much quicker.

References

Czy obecny kryzys finansowy odbije się na branży IT? (2009), Sonda internetowa Biznes IDG.pl, www.idg.pl/sonda/1679/Czy.obecny.kryzys.finansowy.odbije.sie.na.branzy.IT.html [15-03-2009].

Dyczkowski M. (2005), How the home IT projects management practice has been changed? The results of the comparative researches done in the years 2002-2004, [in:] *Information Management*, Eds. B.F. Kubiak, A. Korowicki, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2005, pp. 141-148.

Dyczkowski M. (2006a), Ocena przedsięwzięć informatycznych w małych i średnich przedsiębiorstwach, [in:] *Nowoczesne technologie informacyjne w zarządzaniu*, Eds. E. Niedzielska, H. Dudycz, M. Dyczkowski, Prace Naukowe Akademii Ekonomicznej nr 1134, AE, Wrocław, pp. 245-255.

Dyczkowski M. (2006b), Wyniki badania przebiegu i efektów przedsięwzięć informatycznych w przedsiębiorstwach produkcyjnych, [in:] *Systemy wspomagania organizacji SWO'2006*, Eds. H. Sroka, T. Porębska-Miąc, Prace Naukowe Akademii Ekonomicznej, AE, Katowice, pp. 511-520.

Dyczkowski M. (2006c), Wyniki badania kluczowych czynników sukcesu przedsięwzięć informatycznych, [in:] Informatyka Ekonomiczna 9, Ed. A. Nowicki, Prace Naukowe Akademii Ekonomicznej nr 1144, AE, Wrocław, pp. 125-139.

Dyczkowski M. (2007a), Skuteczność wdrażania gospodarczych systemów informacyjnych w świetle badań ankietowych, [in:] *Zastosowanie systemów e-biznesu w gospodarce*, Eds. W. Chmielarz, T. Parys, Wydawnictwo Wyższej Szkoły Ekonomiczno-Informatycznej, Warszawa, pp. 167-179.

Dyczkowski M. (2007b), Ocena przebiegu i efektów przedsięwzięć informatycznych. Wybrane wyniki badań porównawczych z lat 2004-2007, [in:] *Systemy wspomagania organizacji SWO'2007*, Eds. T. Porębska-Miąc, H. Sroka, Prace Naukowe Akademii Ekonomicznej, AE, Katowice, pp. 465-474.

Dyczkowski M. (2008), Evaluation of ERP systems implementation projects, [in:] *Advanced Information Technologies for Management AITM'2007*, Eds. J. Korczak, H. Dudycz, M. Dyczkowski, Wrocław University of Economics Research Papers No. 8 (1208), UE, Wrocław, pp. 49-61.

Jaślan M. (2009), *Rynek IT staje się ofiarą kryzysu*, Bankier.pl Polski Portal Finansowy, www.bankier.pl/wiadomosci/print.html?article_id=1939436 [14-07-2009].

Kosowska E. (2008), *Ponad 16% wzrost rynku IT w Polsce*, free article based on "Rynek IT w Polsce 2008. Prognozy rozwoju na lata 2008-2012", PMR Publications July 2008, www.itandtelecompoland.com [6-09-2009].

Olszynka P. (2009a), *Revision of forecasts for IT markets in Poland, Russia and Ukraine*, free article based on "IT market in Poland 2008. Development forecasts 2008-2012 – Update. Impact of the crisis on key data and forecasts", PMR Publications April 2009, www.itandtelecompoland.com [6-09-2009].

Olszynka P. (2009b), *Changes in moods in the Polish IT industry*, free article based on "IT market in Poland 2009. Development forecasts for 2009-2013", PMR Publications June 2009, www.itandtelecompoland.com [6-09-2009].

Rynek IT boleśnie odczuwa kryzys (2009), eGospodarka.pl, www.egospodarka.pl/article/42018/-1/39 [14-07-2009].

Waszczuk P. (2009a), *Forrester Research: W czwartym kwartale br. globalne wydatki na IT zaczną rosnąć*, www.computerworld.pl/news/347251/Forrester.Research.W.czwartym.kwartale.br.globalne.wydatki.na.IT.zaczna.rosnac.html [7-09-2009].

Waszczuk P. (2009b), *Gartner: Spadki nakładów na IT wyższe od wcześniejszych prognoz*, www.idg.pl/news/347557/Gartner.Spadki.nakladow.na.IT.wyzsze.od.wczesniejszych.prognoz.html [6-09-2009].

Wolak D. (2009), *Jak branża IT powinna wykorzystać obecny kryzys*, parkiet.com, archiwum.parkiet.com/artykul/642141_Jak_branza_IT_powinna__wykorzystac_obecny_kryzys.html [6-09-2009].