

## **E-GOVERNMENT AND E-PARTICIPATION DEVELOPMENT IN BALTIC STATES: COMPARISON OF ESTONIA, LATVIA, LITHUANIA**

**Natalija Kostrikova**<sup>1</sup>, MBA; **Baiba Rivza**<sup>2</sup>, Dr.habil.oec

<sup>1,2</sup> Latvia University of Agriculture

**Abstract.** E-government and e-participation are inherent parts of modern societies and economies. Each country chooses its own path of development depending on or influenced by certain socio-economic indicators as well as political will. The **aim** of the current research was to find socio-economic differences in e-government and e-participation development patterns in the three Baltic States – Estonia, Latvia and Lithuania. The following research **methods** were applied: 1) descriptive statistics to compare levels of e-government and e-participation in the three countries; 2) correlation analysis to find relationships between socio-economic indicators and indicators of e-government and e-participation in the three countries. The current research put forward two **hypotheses**: H1: Estonia, Latvia and Lithuania have different dynamics in e-government and e-participation development. H2: Estonia, Latvia and Lithuania have different patterns of interconnections between socio-economic indicators and e-government and e-participation development. The research confirmed both hypotheses and suggested the following proposals based on research results: 1) to facilitate e-government and e-participation development in Latvia authorities should stress efforts on measures increasing economic competitiveness and curbing corruption; 2) to facilitate e-government and e-participation development in Lithuania authorities should stress efforts on measures supporting national income growth; 3) to facilitate e-participation development in Estonia authorities should stress efforts on measures supporting national income growth.

**Key words:** E-government, E-participation, Estonia, Latvia, Lithuania.

**JEL code:** C01, H11, L86, O11

### **Introduction**

There is a positive global trend towards higher levels of e-government development as countries in all regions are increasingly embracing innovation and utilizing ICTs to deliver services and engage people in decision-making processes (UNDESA, 2016). The rapid diffusion of ICTs gives rise to new business models and revolutionizes industries, bearing great promise for a future wave of innovations that could drive longer-term growth (Schwab and Sala-i-Martin, 2015).

Since e-government and e-participation are recent developments in modern societies, those areas suffer from the lack of aggregated and standardized evidence for comparing countries. Though some research papers investigated patterns of e-government and e-participation in different countries, none of them focused on the comparison of the three Baltic States.

The **aim** of the current research is to find socio-economic differences in e-government and e-participation development patterns in the three Baltic States – Estonia, Latvia and Lithuania.

The following research **tasks** were set: 1) to gather and analyse quantitative and qualitative data about e-government and e-participation levels in the three Baltic States 2) to analyse the relationships between selected socio-economic indicators and e-government and e-participation levels in the three Baltic States.

The current research puts forward the following **hypotheses**.

**H1:** Estonia, Latvia and Lithuania have different dynamics in e-government and e-participation development.

**H2:** Estonia, Latvia and Lithuania have different patterns of interconnections between socio-economic indicators and indicators of e-government and e-participation development.

The following **research methods** were applied: 1) descriptive statistics to compare levels of e-government and e-participation in three countries; 2) correlation analysis to find relationships between socio-economic indicators and indicators of e-government and e-participation in three countries; 3) critical analysis of qualitative information.

The following **research materials** were used:

- 1) United Nations' E-Government Surveys; 2) European Commission's E-Government Benchmark Studies; 3) World Economic Forum's Global Competitiveness Reports; 4) Transparency International's Corruption Perceptions Index Reports; 5) datasets with indicators from the World Bank, the World Economic Forum, the United Nations, the European Commission, and Transparency International.

There are several indices used by multilateral institutions to assess levels of e-government and e-participation.

The United Nations uses two key indicators in its E-government surveys.

- E-government-development index (EGDI) is used to measure the readiness and capacity of national administrations to use ICT to deliver public services consisting of: 1) Telecommunication Infrastructure component; 2) Online Service component and 3) Human Capital component.
- E-Participation Index (EPI) measures e-participation according to a three-level model of participation that includes: 1) e-information – provision of information on the Internet; 2) e-consultation – organizing public consultations online; and 3) e-decision-making – involving citizens directly in decision processes.

The European Commission uses four key indicators in its E-government benchmark studies.

- User Centricity benchmark assesses the availability and usability of public e-services and examines awareness and barriers to use.
- Transparent Government benchmark evaluates the transparency of government authorities' operations and service delivery procedures and the accessibility of personal data to users.
- Cross Border Mobility benchmark measures the availability and usability of cross border services.

- Key Enablers benchmark assesses the availability of key enablers such as Single Sign On and eID functionalities.

## Research results and discussion

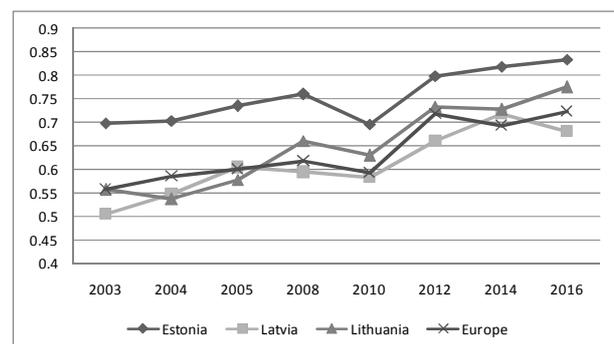
### 1. Comparison of e-government and e-participation levels in Estonia, Latvia, Lithuania

All the three countries have shown growth in EGDI from 2003 through 2016, however growth paths differed – direction of EGDI change was different in at least 2 out of 7 cases observed for each pair of countries (Figure 1).

EGDI level of Estonia has been comfortably higher than Latvia's, Lithuania's and Europe's average during all the 8 years observed. Estonian growth was mainly driven by Telecommunications Infrastructure Component (47.02 % growth) and to a lesser extent by Online Services component (38.85 % growth).

Latvia showed the lowest EGDI among the three Baltic countries in 6 out of 8 years observed and a lower EGDI level than Europe's average in 6 out of 8 years observed.

Among the three Baltic countries, Lithuania has made the biggest progress from 2003 through 2016 – EGDI has increased by 39.01 % (vs. 19.40 % in Estonia and 34.66 % in Latvia), driven by Telecommunications Infrastructure component (187.25 % growth).

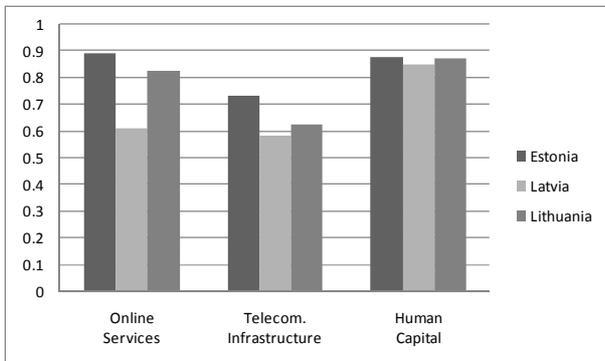


Source: UNDESA, 2003, 2004, 2005, 2008, 2010, 2012, 2014, 2016

Fig. 1. E-government development in Estonia, Latvia, Lithuania in the period 2003-2016, indices

In 2016 Estonia and Lithuania score "very high" (above 0.75) according to the UN classification while Latvia scores just "high" (between 0.5 and 0.75). Latvia's EGDI is mostly

lagging in the area of Online Services and to a lesser extent in the area of Telecommunications Infrastructure, while Human Capital component is almost at the same level in all the three countries (Figure 2).



Source: UNDESA, 2016

Fig. 2. E-government development components in Estonia, Latvia, Lithuania in 2016, indices

E-government development in the Baltic States has started from the adoption of the following policy documents:

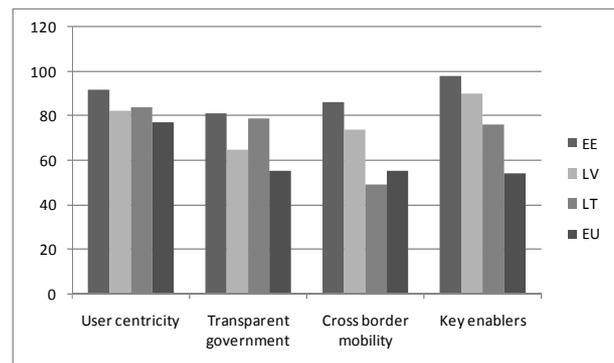
- In 1998 the Estonian Parliament approved the Estonian principles of the initial ICT policy, which served as a basis for making public policy decisions to support the rise of the information society on the basis of an action plan (EC, 2016).
- In July 2001, the Cabinet of Ministers of Latvia adopted the "Public Administration Reform Strategy 2001- 2006" that envisaged a uniform, purposeful and forward-thinking Public Administration whose objectives included achieving citizen involvement in state governance processes and providing high quality public services to citizens (EC, 2015).
- In February 2001, the Government of Lithuania approved the National Concept of Development of the Information Society, where it placed increased importance to e-government (EC, 2015).

Higher level of e-government in Estonia can be explained by the fact that e-government vision emerged much earlier in Estonia than in Latvia and Lithuania, even before official adoption of strategic policy papers and e-initiatives. In 1993, a strategy paper was prepared by the IT

community for establishing foundations and principles for the management of modern, well-functioning state information systems (Sirendi, 2013). In 2001, Estonia introduced an X-road data exchange layer that allowed the nation's various e-services databases, both in the public and private sector, to link up and operate in harmony (E-estonia, 2016).

Estonia introduced its Electronic ID card program in 2002 and by far it is the most highly-developed national ID card system in the world (E-estonia, 2016). By contrast, Lithuania introduced electronic ID cards in 2009 and Latvia was the last Baltic country to introduce electronic ID cards in 2012.

The EC E-government benchmark study in 2015 confirms Estonian leadership in all e-government aspects assessed (Figure 3).



Source: The European Commission, 2016

Fig. 3. E-government benchmarks in Estonia, Latvia, Lithuania in 2014-2015, indices

It also indicates that among the three countries Latvia substantially lags in the area of Transparent Government whilst Lithuania substantially lags in the area of Cross Border Mobility and to a lesser extent in the area of Key Enablers. Almost all benchmarks in all countries are above the EU average. The only exception is a Cross Border Mobility benchmark in Lithuania that is slightly lower than the EU average.

Estonia has been at the forefront of online public services for a few years and is the best performing country in Europe in 2015 with 80 % share of e-government users (EC DG COMM, 2016). The use of digital services in Estonia saves around 2.8 million hours of work in a year,

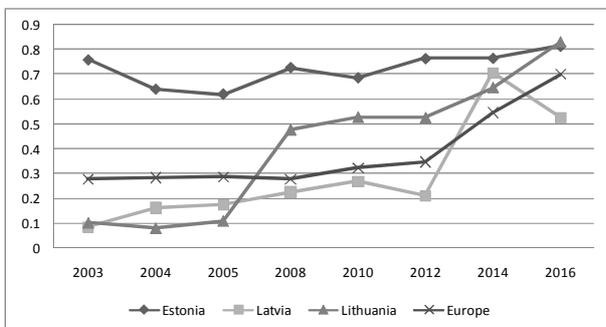
meaning that every year e-services save an amount equal to 2 % of the GDP (Siil, 2014).

In Latvia, there has been a positive growth in the number of e-government users in 2015 with a 36 % share surpassing the EU average of 32 % (EC DG COMM, 2016), however, still below the levels of Estonia and Lithuania.

Lithuania has made progress towards increasing its uptake of e-government with 42 % share of e-government users, however the country has been lagging behind in the dimension of Open Data (EC DG COMM, 2016).

E-Participation is about fostering civic engagement and open, participatory governance through ICTs with an objective to improve access to information and public services as well as to promote participation in policy-making, both for the empowerment of individual citizens and the benefit of society as a whole (UNDESA, 2016).

All the three countries have shown growth in EPI from 2003 through 2016, however growth paths differed – direction of EPI change was different in at least 2 out of 7 cases observed for each pair of countries (Figure 4).



Source: UNDESA, 2003, 2004, 2005, 2008, 2010, 2012, 2014, 2016

Fig. 4. E-participation in Estonia, Latvia, Lithuania in the period 2003-2016, indices

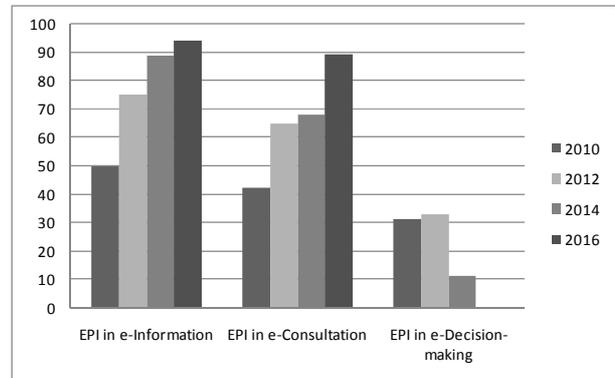
Among the three Baltic countries, Lithuania has made the biggest progress from 2003 through 2016 – EPI has increased by 703.19 % (vs. 7.25 % in Estonia and 509.51 % in Latvia).

Since 2003 through 2014, EPI level of Estonia has been higher than Latvia's, Lithuania's and Europe's average.

Only in 2016 Estonian EPI was outperformed by Lithuanian EPI, mainly driven by e-participation in e-consultation (64.07 % growth)

and emergence of e-participation in e-decision-making.

Estonian EPI has mainly been driven by e-participation in e-information and e-consultation whilst e-participation in e-decision-making has historically been much lower and even reached 0 in 2016 (Figure 5).



Source: UNDESA, 2010, 2012, 2014, 2016

Fig. 5. E-participation in e-Information, e-Consultation and e-Decision-making in Estonia in 2010, 2012, 2014 and 2016, %

Kitsing suggests that e-voting in Estonia has not made substantial contribution to online democratic participation other than making voting more convenient for certain segments of society, and the government portal for encouraging citizens to express their views about new laws suffers from both unwillingness of citizens to participate and most ministries to make new laws available (Kitsing, 2011).

Latvia showed the lowest EPI among the three Baltic countries in 5 out of 8 years observed and a lower EPI level than Europe's average in 7 out of 8 years observed.

Only in 2014 Latvian EPI outperformed Europe's average, but in 2016 it decreased again dragged down by lower e-participation in e-decision-making (35.64 % decline) and e-information (27.84 % decline).

## 2. Correlation analysis between socio-economic indicators and indicators of e-government and e-participation in Estonia, Latvia, Lithuania

A number of research papers have found relationships between the following socio-economic indicators and e-government and e-participation levels.

- Country's income is positively associated with the levels of e-government and e-participation (Azad et al, 2010; Das et al, 2011; Srivastava and Teo, 2008; UNDESA, 2016; Wilkinson and Cappel, 2005).
- Corruption is negatively associated with the level of e-government (Bertot et al, 2010; Corojan and Criado, 2012; Heeks, 1999; Kim, 2014; Elbahnasawy, 2014; Krishnan et al, 2013; Lupu and Lazar, 2015; Shim and Eom, 2008).
- Economic competitiveness is positively associated with the level of e-government (Dutta and Jain, 2005; Srivastava and Teo, 2010, UNDESA, 2016).
- E-participation is positively associated with the level of e-government (Krishnan et al, 2012).

A number of research papers have found no relationship between the following socio-economic indicators and e-government and e-participation levels.

- Governance is not significantly associated with e-participation and e-government maturity (Das et al, 2011; Krishnan et al, 2012).
- The relation between the E-participation index and indices of democracy and participation is non-existent (Gronlund, 2011).

Based on relations found in previous researches, the following socio-economic indicators were selected for the current research:

- Gross National Income (GNI) per capita, constant prices, local currency units (The World Bank, 2004-2016);
- Corruption Perceptions Index (Transparency International, 2002-2015);
- Global Competitiveness Index (The World Economic Forum (2006-2016).

To find interconnections between selected socio-economic indicators and E-government development indices and E-participation indices, the following time periods were applied:

- Base year ( $y_1$ ) vs. base year ( $y_1$ );
- Base year ( $y_1$ ) vs. preceding year ( $y_0$ );

- Base year ( $y_1$ ) vs. following year ( $y_2$ ).

The three countries show different patterns in interconnectedness of EGDI and GNI per capita (Table 1).

In Estonia, the strongest correlation (0.9317) is between base year's EGDI and base year's GNI per capita, meaning that those indicators evolve simultaneously and neither of the indicators has much stronger influence on each other (0.7804 vs. 0.7796).

Table 1

**Correlations between EGDI and GNI per capita in Estonia, Latvia, Lithuania in 2003-2016**

EGDI in $y_1$ vs.	Estonia	Latvia	Lithuania
GNI p.c. in $y_1$	0.9317	0.8075	0.9599
GNI p.c. in $y_0$	0.7804	0.4932	0.9271
GNI p.c. in $y_2$	0.7796	0.9638	0.9304

Source: Author's calculations based on USDESA data 2003-2016, and the World Bank data 2004-2015

In Latvia, the strongest correlation (0.9638) is between base year EGDI and following year GNI per capita meaning that EGDI has much stronger influence on GNI per capita rather than vice versa (0.9638 vs. 0.4932).

In Lithuania, there are equally strong correlations between base year's EGDI and: 1) base year's GNI per capita (0.9599); 2) preceding year's GNI per capita (0.9271); and 3) following year's GNI per capita (0.9304), meaning that EGDI and GNI per capita equally and strongly stimulate each other.

The three countries show slightly different patterns in interconnectedness of EGDI and CPI (Table 2).

Table 2

**Correlations between EGDI and CPI in Estonia, Latvia, Lithuania in 2002-2016**

EGDI in $y_1$ vs.	Estonia	Latvia	Lithuania
CPI in $y_1$	0.6890	0.9184	0.7837
CPI in $y_0$	0.7557	0.7928	0.7612
CPI in $y_2$	0.8728	0.9603	0.9231

Source: Author's calculations based on USDESA data 2003-2016 and Transparency International data 2002-2015

In all the three countries, the strongest correlation is between base year's EGDI and

following year's CPI, meaning that EGDI stimulates CPI to a greater extent rather than vice versa. Latvia has the strongest correlation (0.9603) in comparison to Lithuania (0.9231) and Estonia (0.8728).

The correlations between base year's EGDI and preceding year's CPI are also strong, but slightly weaker: 0.7928 in Latvia; 0.7612 in Lithuania; and 0.7557 in Estonia.

Among the three countries, Latvia has the strongest correlation between base year's EGDI and the base year's CPI (0.9184), meaning that EGDI and CPI evolve with the greatest coherence.

The three countries show similar patterns in interconnectedness of EGDI and GCI (Table 3).

Table 3

**Correlations between EGDI and GCI in Estonia, Latvia, Lithuania in 2006-2016**

EGDI in y1 vs.	Estonia	Latvia	Lithuania
GCI in y1	0.8273	0.9582	0.8035
GCI in y0	0.5533	0.8103	0.7234
GCI in y2	0.1203	0.3422	0.3206

*Source: Author's calculations based on USDESA data 2005-2016 and the World Economic Forum data 2006-2016*

In all the three countries, the strongest correlation is between base year's EGDI and base year's GCI, meaning that those indicators evolve simultaneously. Latvia has the strongest correlation (0.9582) in comparison to Estonia (0.8273) and Lithuania (0.8035).

The correlations between base year's EGDI and preceding year's GCI are slightly weaker in Latvia (0.8103) and Lithuania (0.7234) and much weaker in Estonia (0.5533).

The correlations between base year's EGDI and following year's GCI are weak in all the three countries being equally weak - in Latvia (0.3422) and Lithuania (0.3206) and almost non-existent in Estonia (0.1203).

The three countries show different patterns in interconnectedness of EPI and GNI per capita (Table 4).

**Correlations between EPI and GNI per capita in Estonia, Latvia, Lithuania in 2003-2016**

EPI in y1 vs.	Estonia	Latvia	Lithuania
GNI p.c. in y1	0.8752	0.6533	0.9273
GNI p.c. in y0	0.9034	0.6369	0.9691
GNI p.c. in y2	0.1579	0.7722	0.8912

*Source: Author's calculations based on USDESA data 2003-2016, and the World Bank data 2004-2015*

In Estonia, the strongest correlation (0.9034) is between base year EPI and preceding year GNI per capita, meaning that GNI per capita strongly stimulates EPI whilst EPI influence on following year's GNI per capita is almost non-existent (0.1579).

In Latvia, the strongest correlation (0.7722) is between base year EPI and following year's GNI per capita, meaning that EPI stimulates GNI per capita to a greater extent rather than vice versa (0.6369). However, the strongest correlation in Latvia (0.7722) is weaker than the strongest correlation in Estonia (0.9034) and Lithuania (0.9691).

In Lithuania, the strongest correlation (0.9691) is between base year EPI and preceding year's GNI per capita, meaning that GNI per capita strongly stimulates EPI whilst EPI influence on following year's GNI per capita is also strong but slightly weaker (0.8912).

The three countries show different patterns in interconnectedness of EPI and CPI (Table 5).

Table 5

**Correlations between EPI and CPI in Estonia, Latvia, Lithuania in 2003-2016**

EPI in y1 vs.	Estonia	Latvia	Lithuania
CPI in y1	0.0726	0.8000	0.7288
CPI in y0	0.5829	0.8883	0.6684
CPI in y2	0.1068	0.7079	0.5843

*Source: Author's calculations based on USDESA data 2003-2016 and Transparency International data 2002-2015*

In Estonia, the strongest correlation (0.5829) is between base year's EPI and preceding year's CPI, meaning that CPI moderately stimulates EPI whilst EPI influence on base year's CPI and

following year's CPI is almost non-existent (0.0729 and 0.1579 accordingly).

In Latvia, the strongest correlation (0.8883) is between base year's EPI and preceding year's CPI, meaning that CPI strongly stimulates EPI whilst EPI influence on following year's CPI is weaker (0.7079).

In Lithuania, the strongest correlation (0.7288) is between base year's EPI and base year's CPI, meaning that those indicators evolve simultaneously, whilst CPI has slightly more influence on EPI rather than vice versa (0.6684 vs. 0.5843).

The three countries show slightly different patterns in interconnectedness of EPI and GCI (Table 6).

Table 6

**Correlations between EPI and GCI in Estonia, Latvia, Lithuania in 2006-2016**

EPI in $y_1$ vs.	Estonia	Latvia	Lithuania
GCI in $y_1$	0.8832	0.8768	0.8699
GCI in $y_0$	0,5749	0,7586	0,7817
GCI in $y_2$	-0,4796	-0,1208	-0,0697

Source: Author's calculations based on USDESA data 2005-2016 and the World Economic Forum data 2006-2016

The strongest correlation in all the three countries is between base year's EPI and base year's GCI, meaning that those indicators evolve simultaneously. Estonia has the strongest correlation (0.8832) in comparison with Latvia (0.8768) and Lithuania (0.8699).

In Estonia, GCI moderately influences following year's EPI (0.5749), whilst EPI slightly drags down following year's GCI (-0.4796).

In Latvia, GCI strongly influences following year's EPI (0.7586), whilst the relationship between base year's EPI and following years GCI is almost non-existent (-0.1208).

In Lithuania, GCI strongly influences next year's EPI (0.7817), whilst the opposite relationship is almost non-existent (-0.0697).

The three countries show slightly different patterns in interconnectedness of EGDI and EPI (Table 7).

**Correlations between EGDI and EPI in Estonia, Latvia, Lithuania in 2003-2016**

EGDI in $y_1$ vs.	Estonia	Latvia	Lithuania
EPI in $y_1$	0.6855	0.7598	0.7895
EPI in $y_0$	0.2048	0.6651	0.6423
EPI in $y_2$	0.6845	0.8815	0.8245

Source: Author's calculations based on USDESA data 2003-2016

In Estonia, the strongest correlations are between: 1) base year's EGDI and base year's EPI (0.6855); and 2) base year's EGDI and following year's EPI (0.6845), meaning that EGDI has moderate influence on following year's EPI, whilst the opposite relationship is almost non-existent (0.2048).

In Latvia and Lithuania, the strongest correlations are between base year's EGDI and following year's EPI (0.8815 and 0.8245 accordingly), meaning that EGDI has strong influence on following year's EPI in both countries, whilst the opposite relationship is much weaker (0.6651 and 0.6423 accordingly).

**Conclusions, proposals, recommendations**

- 1) Estonia has historically been a leading country among the Baltic States in terms of e-government and e-participation development, driven by telecommunications infrastructure, online services, e-information and e-consultation development as well as earlier e-government policy planning and implementation; however, e-decision-making still suffers from the lack of e-participation.
- 2) Latvia has historically been the most lagging country among the Baltic States in terms of e-government and e-participation development, dragged down by online services, telecommunications infrastructure, e-information and e-decision-making development; Latvia also substantially lags in the area of transparent government in comparison with Estonia and Lithuania.
- 3) Lithuania has made the biggest progress in e-government and e-participation development

among the three Baltic countries, driven by telecommunications infrastructure and e-consultation development as well as emergence of e-decision-making.

- 4) Although all the three Baltic countries showed growth in both e-government and e-participation, growth patterns differed – the direction of both e-government and e-participation change was different in at least 2 out of 7 cases observed for each pair of countries, thus, H1 is confirmed.
- 5) E-government development strongly stimulates national income growth and e-participation development in Latvia and Lithuania and corruption decrease in all the three Baltic countries, whilst national income growth strongly stimulates e-government development in Lithuania and economic competitiveness increase strongly stimulates e-government development in Latvia.
- 6) E-participation development strongly stimulates national income growth in Lithuania, whilst national income growth strongly stimulates e-participation development in Estonia and Lithuania and corruption decrease strongly stimulates e-participation development in Latvia.
- 7) Although in all cases there were noted similar direction correlations between indicators of national income, corruption and economic competitiveness versus indicators of e-government and e-participation among the three Baltic countries, in most cases the

strengths of correlations substantially differed, meaning that neither of the three Baltic countries had similar patterns of interconnections between socio-economic indicators and indicators of e-government and e-participation combined. Thus, H2 is confirmed.

- 8) To facilitate e-government and e-participation development in Latvia authorities should stress efforts on measures increasing economic competitiveness and curbing corruption.
- 9) To facilitate e-government and e-participation development in Lithuania authorities should stress efforts on measures supporting national income growth.
- 10) To facilitate e-participation development in Estonia authorities should stress efforts on measures supporting national income growth.

### **Acknowledgements**

The paper was financially supported by the Latvia National Research programme EKOSOC-LV.

### **Bibliography**

1. Azad, B., Faraj, S., Goh J.M., Feghali T. (2010). What Shapes Global Diffusion of E-Government: Comparing the Influence of National Governance Institutions. *Journal of Global Information Management*, Vol. 18, p. 17
2. Bertot, J. C., Jaeger, P. T., & Grimes, J. M. (2010). Using ICTs to Create a Culture of Transparency: E-government and Social Media as Openness and Anti-corruption Tools for Societies. *Government Information Quarterly*, Vol. 27, p. 269.
3. Cappel, J., Wilkinson, V. (2005). Impact of Economic Prosperity and Population on e-Government Involvement. *Issues in Information Systems*, Vol. VI, p. 208
4. Corojan, A., Criado, J. I. (2012). Handbook of research one-government in emerging economies: adoption, e-participation, and legal frameworks: E-government for transparency, anti-corruption, and accountability: challenges and opportunities for central American countries. Hershey, PA: *IGI Global*, p. 340.
5. Das, A., Singh, H., Joseph, D. (2011). A Longitudinal Study of E-Government Maturity. *Information & Management*, p. 11
6. Dutta, S., and Jain A. (2005). The Global Information Technology Report: An Analysis of the Diffusion of Information and Communication Technologies of Nations. *Geneva: World Economic Forum*, p. 12

7. EC DG Connect. Estonia (2016). Retrieved: <https://ec.europa.eu/digital-single-market/en/scoreboard/estonia> Access: 27.12.2016
8. EC DG Connect. Lithuania (2016). Retrieved: <https://ec.europa.eu/digital-single-market/en/scoreboard/lithuania> Access: 27.12.2016
9. EC DG Connect. Latvia (2016). Retrieved: <https://ec.europa.eu/digital-single-market/en/scoreboard/latvia> Access: 27.12.2016
10. E-Estonia. Electronic ID Card (2016). Retrieved: <https://e-estonia.com/component/electronic-id-card/> Access: 27.12.2016
11. E-Estonia. X-road. Retrieved: <https://e-estonia.com/component/x-road/> Access: 27.12.2016
12. Elbahnasawy, N. G. (2014). E-government, internet adoption, and corruption: an empirical investigation. *World Development*, Vol. 57, p. 122.
13. European Commission (2015). E-government in Latvia. Edition 17.0, p.16
14. European Commission (2016). E-government in Estonia. Edition 18.0, p. 20
15. European Commission (2015). E-government in Lithuania. Edition 17.0, p. 15
16. Gronlund, A. (2011). Connecting E-Government to Real Government - the Failure of the UN E-Participation Index. *EGOV'11 Proceedings of the 10th IFIP WG 8.5 International Conference on Electronic Government*, p. 36
17. Heeks, R. (1999). Information Technology and the Management of Corruption. *Development in Practice*, Vol. 9, p. 184.
18. Kim, C. K. (2014). Anti-corruption Initiatives and E-government: a Cross-national Study. *Public Organization Review*, Vol 14, p. 385.
19. Kitsing, M. (2011). Online Participation in Estonia: Active Voting, Low Engagement. Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance, p. 20
20. Krishnan, S., Teo, T. S. H., Lim, V. K. G. (2013). Examining the Relationships among E-government Maturity, Corruption, Economic Prosperity and Environmental Degradation: a Cross-country Analysis. *Information & Management*, Vol. 50, p. 644.
21. Krishnan, S. (2014). Electronic Government Maturity: Antecedents and Consequences from a Global Perspective. Singapore: *National University of Singapore*, p. 60
22. Lupu, D., Lazar, C.G. (2015). Influence of e-Government on the Level of Corruption in Some EU and Non-EU States. *Procedia Economics and Finance*, p. 370
23. Sala-i-Martin, X., Schwab, K. (2015). The Global Competitiveness Report 2015-2016. Geneva: *World Economic Forum*, p. 3.
24. Shim, D. C., & Eom, T. H. (2008). E-Government and Anti-corruption: Empirical Analysis of International Data. *International Journal of Public Administration*, Vol. 31, p. 298.
25. Siil, R. (2014). Confessions of an E-Estonian. Retrieved: <http://creativeeconomy.britishcouncil.org/guide/confessions-e-estonian/> Access: 27.12.2016
26. Sirendi, R. (2013). Starting from Scratch: The Case of E-government in Estonia. Retrieved: <http://estonianworld.com/technology/starting-scratch-case-e-government-estonia/> Access: 27.12.2016
27. Srivastava, S.C., Teo, T.S.H. (2008). The Relationship between E-government and National Competitiveness: the Moderating Influence of Environmental Factors. *Communications of the Association for Information Systems* Vol. 23, p. 87.
28. Srivastava, S.C., Teo, T.S.H. (2010). E-Government, E-Business, and National Economic Performance, *Communications of the Association for Information Systems* Vol. 26, p. 278
29. Transparency International. *Corruption Perceptions Index*. Retrieved: <http://www.transparency.org/research/cpi/overview> Access: 13.12.2016
30. UNDESA. Citizen Engagement. Retrieved: <https://publicadministration.un.org/en/eparticipation> Access: 27.12.2016
31. UNDESA. UN E-Government Knowledge Database. Retrieved: <https://publicadministration.un.org/egovkb/en-us/Data-Center> Access: 13.12.2016
32. UNDESA (2016). United Nations E-government Survey 2016: E-government in Support of Sustainable Development, New York: *United Nations*, pp. 126, 220
33. UNDESA (2014). United Nations E-government Survey 2014: E-government for the Future We Want. New York: *United Nations*, p. 19
34. World Bank. World Development Indicators. Retrieved: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#> Access: 13.12.2016
35. World Economic Forum. GCI dataset. Retrieved: <http://reports.weforum.org/global-competitiveness-index/downloads/> Access: 03.01.2017