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State Innovation Policy Challenges in Facilitating Entrepreneurship in the Fintech Sector - Comparison of Georgian and Estonian Cases

Riikliku Innovatsioonipoliitika Väljakutsed Ettevõtluse Edendamisel Finantstehnoloogia Sektoris - Võrdlus Gruusia ja Eesti Näitel

Master`s Thesis

Supervisor: Professor Wolfgang J. M. Drechsler

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Hereby I declare that I am the sole author
of this master`s thesis and it has not been
presented to the any other university for evaluation.

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The master`s thesis meets the established requirements.

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Abstract

Emerging financial technology (Fintech) sector is reshaping the traditional understanding of the finance. The Fintech i.e. technology-based solutions in the financial industry have been attracting more and more attention from the policymakers during the last five years. There could be found some general indicators and influential factors in the academic literature; the policy dilemma is to, on the one hand, regulate disrupted financial sector and embrace the prospects, on the other, enable innovation with easing the restrictions and facilitate entrepreneurship in the Fintech sector.

To analyse the state innovation policy challenges, research provides an overview of the state innovation policy toolkit which is applied to two cases - Estonian and Georgian Fintech sectors. The both cases show some similarities in socio-economic and historical background, from which in Estonian case we have seen a significant development of the overall innovation ecosystem and the Fintech sector, whereas, Georgia lags behind and its innovation ecosystem and accordingly Fintech sector are yet to develop.

The study is providing exploratory research is based on secondary research - reports, academic literature and primary research - interviews with various actors of the Fintech sector. The interview data is analysed with help of the casual loop diagram in order to deduce keynotes regarding the issues posed by the research.

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Chapter 1. - Introduction

During the last five years, there could be seen a disruption of tech start-ups which are becoming a valuable part of the financial sector. Presently, we see a broad range of actors taking away the services traditionally run by banks starting from simple card payments to firm lending, capital management or multi-national payments. Usually, the first target of innovative solutions are the services poorly executed by traditional actors.[1] Mainly every financial service offered by banks is provided by new players as well, or if there is yet untapped space in the market, soon will be acquired by start-ups and other players.

The emerging new setting of the market urges traditional financial actors to embrace disruptive nature of Fintech, and they opt for wider partnerships for approaching a more efficient service delivery aiming to meet the new consumer demands. According to the `Global Fintech Report 2017`, the funding of Fintech start-ups has been boosted by 41% of the annual growth rate over the past four years, over 24% of market share is occupied by Fintech companies which are the second figure after commercial banks (32%). (PricewaterhouseCoopers, 2017) Whereas, traditional companies have been less agile in responding to the emerging consumer expectations. The advantages of Fintech start-ups which have been widely benefiting them are a dynamic organisational setting and targeting new distribution channels and identification of the service gaps which are solved by the latest technology solutions, eventually leading to more valuable propositions for customers. Moreover, lighter regulatory frameworks for Fintech start-ups at the early stages of development, creating additional incentives for better performance in competition against traditional service providers. (Consulting, 2017)

One could assume that the emerging Fintech sector could provide an extensive range of opportunities for the catch-up economies such as in our case are Estonia and Georgia. The idea behind choosing the two cases are similarities in socio-economical background, after regaining independence from the Soviet Union both countries had comparatively the similar starting

[1] Commercial banks, insurance companies and other traditional financial actors.

conditions for economic development. What we have seen so far is that Estonia appears to be one of the most promising and the best-performing country in the Eastern Europe with sound national innovation system and the high innovation capacity, it is often cited as "a model of entrepreneurially-oriented policy". (Forum, 2015) Whereas, Georgia lags behind with a very young national innovation policy systems, with the considerably small economy but gaining more and more traction. However, both countries foresee Fintech sector as a future of finance and would take advantages of the given opportunities. Here could be meant the possibilities of pioneering and gaining the leading positions in the global markets. Furthermore, as an additional beneficial factor the ability for the quick changes could be concerned, as in the both cases, we have small-sized states which could be considered to ease and fasten the dynamic change and adoption to the prospects. The clue for the gaining leading positions in the global market could be the innovation system adopting dynamic reforms and policy measures for enabling innovation in Fintech.

Therefore, reshaping the financial sector, poses serious challenges for the governments, as financial sector was and remains one of the most strategic fields. The rapidly growing Fintech sector arises importance of the state innovation policy, which is ought to enable innovation and facilitate entrepreneurship in the financial sector. One could concern Fintech start-up creation and development to the number of available entrepreneurial positions in the economy that could be filled by financial innovation. The open positions could be perceived as a result of states` successful execution of demand and supply-side innovation policy measures. (Thornton, 1999; Choi & Phan, 2002)

There could be stressed out two major types of state policy effects on overall innovation ecosystem, accordingly `direct` and `indirect` impacts. Indirect policies ought to influence framework conditions whereas direct ones are represented as targeted interventions aiming to create or develop new technologies, the later could also be characterised by direct involvement in interactions among various actors of the ecosystem. (Edquist, Tsipouri, & Hommen, 2000) In general, there could not be found a clear-cut answer which of these two could be more sufficient, both direct and indirect could work and could not for various cases. In practice, the two policy actions are often opposed to each other, direct measures are very effective in reaching immediate goals and social needs, on the other hand, they might fail in creating sustainable national innovation capacities. More precisely, the condition when such initiatives are not accompanied by

more indirect policy measures which could facilitate the formation of innovation networks and support generating knowledge in universities and various public research organisations. (Edquist & Hommen, 1998)

What is more, it could be said that contemporary innovation policy actions could be characterised by the tendency towards indirectness. Even the public procurement known as one of the strongest innovation drivers could play a second role. (Kattel et. al., 2013) Despite the fact that public sector could often be a large user, hence, its purchasing decisions could have certain consequences for steering this process towards the adoption of one technology standard or another. (Leydesforff & Besselaar) Therefore, the research focuses on identifying various challenges for state innovation policies in the Fintech sector and focuses on analysing different approaches and instruments which could be used for facilitating entrepreneurship in this industry. We could hypothesise the following:

H: Innovation policy measures having indirect influences on the FinTech sector show better performance in the developing economies than those having direct effects.

The paper also aims to answer the following questions:

Q1: What are the key barriers and drivers for the state innovation policy in the Fintech sector?

Q2: Do the driving and hindering aspects change over various cases?

The data collection process for the case studies could be divided into two phases, first, analysing existing literature, reports, etc., second, based on the first-phase data, executing interviews with different actors of the Fintech sector, extract the significant factors and process the data using casual analysis.

The paper is divided into five chapters. The first chapter aims to provide an ideological basis for the topic and overview of the research paper. The research methodology and conceptual background regarding the state innovation policy instruments and implication for the Fintech will be provided in the second chapter. In the third chapter the collected data, concerning the both cases, will be analysed. Further, the next 4th chapter will provide the discussion over the results of the analysis and the fifth and final chapter will re-emphasis on the main points and findings.

Chapter 2. - Conceptual background

2.1 - Overview of the state innovation policy toolkit

To begin with, innovation system and policy has been widely discussed in the academic literature. However, we would attract your attention to the aspects which would be relevant for our case study in the financial technology sector. It could be stated that innovation systems are the synergic actions of a wide range of institutions including those engaged in scientific research, generating and diffusing knowledge and technologies, developing new innovative products and processes, also the relevant regulatory institutions such as norms, standards, laws, etc. Metcalfe and Georghiou (1997) defines innovation system as a set of particular institutions which together facilitate technology development and diffusion, based on which governments initiate and implement new policies influencing innovation.

While implementing new policies governments have to take into account three major indicators: transformation pressure - trade and competition policies and general economic policy; capacity for innovation and instruments for handling the change - human capital evolution and innovation policy; hardship during the transformation process in regards to social expectations, labour market, regional policies, and etc. (Lundvall & Borras, 1997).

There could be stressed out four primary policy instruments where governments have the powerful triggers for steering innovation processes. The first could be a broad range of institutions, where the formal aspects as already mentioned are general rules modelling the economic agents` behaviour aiming to determine transaction costs and property rights, reducing uncertainty, creating regulatory grounds for technology creation, diffusion and innovation. The second aspect is infrastructure which could include all aspects of support starting from transportation with ending various technoparks, laboratories, etc. The third one could be government incentives which are considered as a stimulator of targeted areas and the system as a whole; it could involve public spending, R&D efforts, subsidies to stimulate private investments, etc. Fours and the final is education and training which puts emphasis on all levels of education targeting professional, high-

educated human capital for creating innovation absorb capacity. (Feldman & Florida, 1994; Czarnitzki & Toole, 2006; Hussinger, 2003; Lundvall & Borras, 1997)

For broader illustration, the distinction between state innovation policy instruments could be drawn by dividing this field according to two major groups demand and supply-side policy measures. Supply side policy could include education, company competencies, research and development, institutions seeking for mediation between firms and universities, etc. Whereas, demand side policy measures could relate to the institutions fostering diffusion and development of technology, for instance, `Government Technology Procurement` (GTP), regulations and standards, etc. There could be found many labels for understanding public procurement and innovation. Thus, various approaches to policy design. One could hold attention on the policies for which technology and knowledge transfer stand as core concepts. The matter of comparison could be four major types of public procurement - `a generic policy'[2]; `No policy`[3] policy; `technology and industry development`[4] policy and `R&D` policy[5] for innovation-oriented public procurement. (Kattel, Lember, & Kalvet, 2013) Policies, as mentioned above, could be distributed accordingly - innovation-oriented for demand-side and `no policy` policy for the supply-side policy measures.

One could see R&D policy as a public procurement where supporting innovation and technology development is done through the assembling production process by the knowledge creation. According to Lember et al. (2013) public procurement of R&D could have close linkages with public technology procurement, often there could not be found a clear distinction, except the fact that R&D is supposed for radical innovations, whereas GTP could opt for both incremental and radical innovation. (Lerner, 1999) The core of the idea of supporting pre-commercial phase could be the sharing technological risks between procurers and potential suppliers. (Edler & Georghiou, 2007)

Public procurement as technology and industry development policy could refer to the targeting strategic markets of the national economy and solve the challenge of creating sophisticating demand for such markets. Besides of putting pressure on R&D-intensive actions

[2] "Innovation policy goals incorporated into all levels of public procurement decisions."
[3] "Innovation policy based on `perfect competition`, minimizing state interventions."
[4] "Mission-critical technology development, sometimes in form of catalytic procurement."
[5] "Procurement of R&D to meet social demand and increase R&D spending".

and new technology platform creation, it could also include standard-setting or technology transfer incentives.

Generic innovation-oriented public procurement policy could be described through the government`s decisions for more certain sectors, and furthermore, it could be illustrated as the policy for `all seasons`. Government consumption is perceived as a powerful driver of innovation, which could include dialogues, variant bids, various idea competitions, etc. It could be said that in this case general public procurement gains importance of particular policy tool for innovation development.

Lastly, no-policy as public procurement could close links with the ideology that market will settle everything. In this case, governments opt for minimum interventions into the economy; the assumption is that public funds should not be used for organising the market. There is still some space for innovative solutions initiated and implemented by the public organisations but without any connections to the innovation policy areas. (Kattel, Lember, & Kalvet, 2013)

2.1.1 - Supply-side innovation policy measures

It could be said that the most common supply-side policies deal with mobilising scientific knowledge and technology. A typical example of this kind of policy would be the financial backing of R&D efforts. However, there could be found other instances involving diffusion of accumulated knowledge through collaboration, alike sharing technology and information between different actors of the ecosystem, for example, universities and companies. Establishing such linkages between firms and research organisations could also involve some risks together with benefits. The most beneficial part is transferring knowledge from one unit to another creating shared pool of competencies, while possible risks could be the contradictions between the culture of the industry and university, compromising it`s ethical standards, hindering the rate of scientific advancement and preventing the academic community from fulfilling its social purposes. (Foray, 2005)

Supply-side policy instruments could consist of finance and equity support where private venture capital funds are infused and sponsored by public venture capital, loss assurance; monetary instruments where is meant reducing corporation tax for the size of increasing R&D expenditures. Also, it could stimulate diminishing of employers payroll tax and R&D workers` personal

encouragement through reduced taxes. Additionally, it could provide support for public sector research - university funding, laboratory funding and facilitating by sharing equipment, collaborative grants, strategic programmes for industry facilitation by contracting research. Moreover, it could support mobility and training - specific courses for firms and entrepreneurs, subsidised endorsements, industrial research scholarships, support for recruitment of scientists; grants for technological and industrial advancements which includes - subsidies for R&D, collaborative grants, reimbursable loans, prizes to spend on R&D, etc.

For practical purposes, it would be reasonable to outline differences between two cases where the standard setting takes place within the domain of public technology procurement and the cases where standard setting serves solely for regulatory purposes. It should be determined that these two activities can overlap in some cases. For example, public agencies (as buyers) might find themselves obliged to conduct within the frames of set standards established by governments even in a regular public procurement of already available products and services. (Edquist, Tsipouri, & Hommen, 2000)

2.1.2 - Demand-side innovation policy measures

The demand-side policy measures are usually incorporating regulations, laws, influences on technology flow within the entrepreneurial ecosystem, public technology procurement aiming the diffusion and development of technology, etc. One of the strongest instrument of demand-side policy measure could be `public technology procurement` (GTP) term of the 90s which was replaced in early 2000s by `public procurement for innovation` (PPI). (Edquist & Zabala-Iturriagagoitia, 2012) PPI could be the case when the state stands as a demand generator for the products which yet does not exist and places orders eventually leading to the technology advancements needed for meeting the new demand scale. GTP should be differentiated from the `government procurement` - when the state is fostering the demand for the already existed products for which no additional technological advancements are required. The later could be associated with the capitalist economic view where the market is considered to solve most of the demands and generate economic needs, whereas government technology procurement could be used as a targeting specific societal challenges which are unlikely to be met by the market. In other words, public procurement of innovation could give an opportunity to speed up and stare innovation

advancement. (Edquist & Hommen, Government Technology Procurement and Innovation Theory, 1998)

For better understanding GTP and therefore PPI could take place in two types creation-oriented and diffusion-oriented government technology procurement. The distinction between the two could be in processes – during the creation-oriented case new products, processes, systems and in general new knowledge is created, whereas, diffusion-oriented represents the local adaptation of already existing technologies. (Bozeman, 2000) One could argue could argue that diffusion-oriented PPI has roots in technology transfer processes - technological knowledge absorption by human and firms which leads to a steady and wider accumulation of knowledge, in our case within a particular country. (Liu, 2006; Wahab & Rose, 2012) As a result of this, it should also be stated that drawing a line between knowledge and technology transfer could be difficult; many researchers consider the two concepts are having similar meaning, as the knowledge is the crucial element which underlies technology transfer. Thus, we here refer partly to knowledge transfer as well. (Gibson & Sung, 2000; Das, 1987; Autio & Laamanen, 1995)

As a core of public technology procurement is perceived societal problems and needs, thus, is a demand-side policy instrument it could be the useful tool for identifying and generating new demands. Therefore, it could be seen as a powerful instrument for supporting the development of new products and services and what is more, solving wider societal problems such as for instance, high unemployment. Often, public technology procurement and PPI could be combined with R&D subsidise as part of the demand-side process for technical advancement. (Edquist et. al., 2000)

2.1.3 - Sector-specific innovation policy measures

One of the essential influences regarding the selection of policy instrument toolkit is sector-specific policy measures. As far as, every firm has its unique assets regarding technology and knowledge which is rooted within the institutional context, the research theory about sector-specific innovation policy regime proposes that every sector has its specific knowledge base, technologies, inputs and demand. (Kumar et. al., 1999; Bozeman 2000; Radosevic 1999) For more in-depth analysis by the technology, we mean something that Arrow has described as information which becomes an economic commodity. Such a piece of information could be easily replicated and transmitted by the entrepreneurs for very low costs and efforts. (Arrow, 1962)

As a counter-opinion, Pavitt (1985) proposes that technology could be more accurate knowledge about certain applications mostly cumulative within the firms. Therefore, this argument stands for technology as a `firm-specific` experience and asset, which could become the basis of company`s competitive `unfair` advantage. (Pavitt, 1985) Here we could refer to resource-based theories, according to which technology includes knowledge, firm-specific assets, organisational capability, practices, etc., to generalise, firm-specific assets which are unique, rare and difficult to replicated. (Prahalad & Hamel, 1990) Technology is a tactic knowledge owned by real organisations, which could pose various special transition conditions and could be not easily reproduced. (Nonaka, 1994) Furthermore, according to Mackenzie at al. (1999) technology is associated with physical objects, artefacts and the processes of making these objects. (MacKenzie & Wajcman, 1999)

According to the evolutionary theory - common behavioural and organisational characteristics with the similar scope of learning patterns, behaviour, and organisational forms can be identified in various firms that deal with similar technologies, conduct research based on the similar knowledge base, engage in related production activities and operate within in the same institutional settings. For example, an individual technological structure dictates necessary steps firms have to take to innovate. Determines what type of knowledge will be gained in the process, paints the picture of possibilities and limitations of a given trend, and affects the developmental diversity's range of the spectrum, mostly guiding the direction of evolution firms will go through. (Malerba & Orsenigo, 1996; Malerba, 2002) There is no doubt that from the wide range of agents of the ecosystem, only governments have the full toolkit of instruments which could shape and steer the processes and interactions among all agents, thus it could behave as a major force influencing the sector-specific technology transfer.

As already mentioned above the sectoral system has its scientific know-how and a pool of information and data to draw from, as well as a capacity of current and possible future demand. Distinct technological advancement is backed and supported from sector to sector, scientific breakthroughs and R&D advancements being examples of determining factors for selection. (Rosenberg, 1984) Technical knowledge revolves around the proper balance of transparency and discretion, collaboration and independence, centre of which shifts based on the technologies involved and is noticeably different among sectors. (Winter, 1987) What is more, underlying

demand and technologies could constitute to considerable pressure on firms organisation and behaviour, and noticeably these pressures could differ from sector to sector as well. The existing environment of entrepreneurial ecosystem brings about specific nature of the challenges firms have to face and solve in their business, these conditions again are different for various sectors, so that leads to diversification in innovation and actions companies take. (Malerba, 2002)

The concept of technological regimes shows the characteristics of the knowledge environment in which different companies are operating. It could be described as a summary of accumulated expertise and viability of the related knowledge bases.(Winter, 1982; Orsenigo, 1996; Malerba and Orsenigo, 1997) More precisely, technological opportunities provide a good indication of potential prospects of innovation for any investment conditions. Accordingly, significant opportunities serve as important motivators for seeking for innovation, as far as, they are less likely to be hindered due to the lack of resources and results in numerous technological breakthroughs.

2.2 - Some indicators for innovation policy instrument choice

Decision making regarding the innovation policy instruments could be divided into three main steps: I. first selection of specific tools from the innovation toolkit; II. Respecting the state policy area context; III. Designing instrument mix, creating a set of complementary tools for addressing identified challenge. The set or an individual instrument could be chosen in order to address particular, small problem, whereas generally, policymakers also pay much to the complementary, contrasting or synergic impacts of selected instruments in regards to other dimensions. (Edquist & Borras, 2013)

However, in general, decisions regarding the policy instruments are the result of the problems and challenges which innovation policies are facing. Accordingly, policies ought to tackle these threats. One could divide the strategic objectives into two major types, first could be global challenges which might be roughly the same for all cases and second, specific contextual ones. From the general issues, we could refer to the Bozeman`s (2000) taxonomy for policy failures[6] in pursuing successful technology and knowledge diffusion. The broad set of challenges and policy failures could be partly presented in all cases, but they always come in combination to

[6] See (Bozeman, 2000, pp. 631)

narrower and more specific problems which are identified in a manner as mentioned above, they often act as a general guide leading efficient identification of innovation policy challenges.

More precisely, decision making regarding the instruments starts with identifying the specific problems of the innovation system. The sources based on which the problems are identified could vary, however, the most efficient and sufficient source of information could be innovation indicators. Usually, indicators are the combination of regular statistical series at national and international level; often it could be innovation surveys providing more accurate company-based data regarding the innovation trends. The second source for information could be expert-based analyses of future challenges in various technology fields, here could be mentioned the rise of benchmarks presenting quantitative goals defined by the public agencies articulating best case performance. Third and final could also be expert-based information but in this case independent expert assessment of innovation policy, in other words, evaluation of state policies executed by various organisations and experts. (Edquist & Borras, 2013)

It could be said that besides the economic performance measures there could also be different indicators or influences for choosing the set of instruments, for instance, political interests, lobbying of various interests groups. Thus, there usually could be seen not entirely right policies, as the combination of instruments creates innovation policy as such. There could not also be regarded a one-size fit all perspective, even if the set or a specific instrument theoretically should solve the challenge with the same logic, in every case they are unique as all cases have its particular social, economic, political and organisational context. Therefore, it is crucial for policymakers to adapt the instruments to the case context and making the set of instruments dynamic not to reach ad-hoc decision making, all factors and indicators should be processed continuously, and a mix of instruments should be matched to new realities.

2.3 - Implications for the Fintech sector

Before going to state innovation policy implications for Fintech sector, one should briefly describe what is meant by Fintech which refers to the technology-based innovative solutions in the financial sector. With its most general understanding Fintech companies are high-growth organisations which combine innovative business models and technology for enabling, boosting and disrupting financial sector. It should be stated that the term Fintech does not necessarily narrow down the variety of actors to only start-ups and new entrants. However, the industry considers

already existing players of the market such as, for instance, scale-ups, maturing companies, even non-financial companies such as telecommunication providers and e-retailers are involved in developing and adopting financial technologies. (world, 2015) Since the 2008 year Fintech has been gaining more and more attention from both developed and developing the world, as it poses various risks and significant opportunities for a new age of the financial sector.

The 2008 year is not accidentally perceived as a turning point of the Fintech sector, as it could be said that global financial crisis has catalysed the growth of new age of financial sector. (Arner, et. al., 2015) As an argument could be counted the fact that the origins of the financial crisis were widely understood in public, perceptions regarding the commercial banks have considerably languished. (Agarwal et. al., 2014) Accumulated negative impacts of the financial crisis has brought about the reality where post-financial crisis regulations have been put into focus and restricted. (Barberis, 2012) Reduced employment and less available loans posed additional challenges for financial markets.

Currently, emerging FinTech companies are providing new options for raising the equity financing and debt, managing investments, obtaining new financial instruments and, etc. For better illustration, excellent examples of new technologies could be Bitcoins and other crypto-currencies which are built on bases of big data for risk analysis, various peer-to-peer platforms, digitalized trading and, etc. (Milne, 2015). In the developed world more and more pressure is put on the FinTech start-ups, the US remains as a leader in regards raising venture capital distribution starting from 2012 from $2 billion reaching $8 billion in 2015. There could be seen a shift towards the deals in FinTech companies as many start-ups are already competing with the traditional financial sector. To catch-up with the tech-savvy start-ups traditional banking is raising the expenditures in research and development or choose the other strategy to collaborate and acquire such start-ups. However, the balance between collaborator and competitor FinTech companies remains over 62% of start-ups are eager with gain more revenues and power independently. (Accenture, 2016)

What is more, the financial sector has been and is one of the most important fields for developments and regulations from the governments. Thus, providing the most suitable policy measures, while providing incentives for facilitating innovation is one of the biggest dilemmas for the policymakers. Usually, FinTech companies are targeting specific services which are poorly executed by traditional financial institutions, nonetheless targeted end-users often provide narrow

feedback regarding the future opportunities and development paths. Therefore, market forces alone are perceived not to be capable of ensuring practical matching user needs and provided services. (Chiu, 2015) In turn, this could lead to a limited uptake and usage of emerging markets and financial inclusion. Moreover, Ross P. Buckley and Louise Malady[7] propose that governments tend to support the success of emerging technologies through institutional and regulatory settings, whereas it could be argued that more focus is needed in developing consumer demand through promoting partnerships and financial inclusion. (Institute, 2015)

On the one hand, the state is responsible for regulating the financial sector and taking steps to control commercial banking and other financial institutions. On the other, the state is also responsible for facilitating entrepreneurship and innovation in this area as mentioned earlier, what creates a policy dilemma for building effective regulatory frameworks, while stimulating FinTech innovation. Philip Treleaven[8] states that financial regulations experience massive pressures what in turn have an influence on public procurement, there could be found unprecedented opportunities for adopting new reforms favouring the future success of the financial innovation industry. Moreover, it is crucial to understand substantive changes in the financial sector, for instance, new distribution channels where might occur unlicensed intermediaries. Regulations should continuously audit the market developments regarding the legal relationships, private property and enforcement rights, as for `disruptive innovations`[9] the need of adopting new rules might reveal. (Chiu, 2015)

Furthermore, to analyse the public procurement implications for FinTech sector. First, the challenges of financial regulators should be identified, as the existing research focuses on the importance of rethinking regulatory frameworks for FinTech. One major issue which is receiving greater emphasis is financial inclusion, which might be concerned to the broader economic development. Historically, state regulators` aim has been to maintain safety and soundness of the financial system and focus has been commercial banks as the biggest actors of this system. Today, the primary challenge for the policy makers is to fill the gap between the market forces and end user needs. (Habib, 2013) In other words, policymakers have dual regulatory focus, on the one

[7] See in The Journal of Financial Perspectives report 2015; available at: https://goo.gl/YgXEwV
[8] See in The Journal of Financial Perspectives report 2015; `Financial regulation of Fintech` available at: https://goo.gl/YgXEwV
[9] "significant new technologies, requir[ing] considerable change in consumption patterns and are perceived as offering substantially enhanced benefits." (Veryzer, 1998)

hand, promoting financial innovations reaching excluded consumers and on the other, delivering sound protection systems to new adaptors of FinTech. "Regulators who first understand consumer demand can better appreciate which market developments need to be encouraged or facilitated through policy and regulatory changes". (Buckley & Malady, 2015) Thus, public procurement could be a powerful instrument in steering development, supporting demand within targeted segments, intelligently directing industry efforts towards strategic parts of the FinTech ecosystem.

As discussed above, public procurement could be characterised by creating demand for new technologies and through generated application encourage innovation. Besides state regulatory challenges, it could be said that there is a broad range of efforts which could be taken by governments for facilitating productive FinTech ecosystem. From the demand-side policy measures could be stressed out, for instance, shifting government payments towards to electronic G2P[10] and P2G[11]. Electronic payments from the governments would contribute to building consumer demand for new payment methods, in turn raising the level of safety perceptions among various actors of the ecosystem. What is more, digitalizing government payments could dramatically reduce costs of the transactions. (Milne, 2015) The importance of the encouraging partnership building among different actors is also gaining more attention - partnerships could bring new unregulated before players into the framework. (Glas & Truszel, 2016) From the supply-side policy measures examples could be, for instance, promoting financial literacy which leads to more openness of end users, argues Tilman Ehrbeck.[12] In addition, developing system infrastructure which will enable interoperability and interconnectivity could aid interest of consumers. From the European perspective, the most critical policy area is standardisation of financial data, creating Single European Financial Data Area, shifting towards to more open-data based systems which will allow big processing data and making it accessible to all actors (see European Central Bank report 2016).

2.4 - Research methodology and limitations

We decided to adopt the multiple case study approach for the exploratory research. (Yin, 2009) An exploratory case study approach is presumed appropriate for this study for various

[10] Government-to-person payments
[11] Person-to-government payments
[12] Tilman Ehrbeck - Avoid blaming the victim in the financial literacy blame; Huffington Post, 19 Feb. 2014, available at: http://www.huffingtonpost.com/tilman-ehrbeck/the-financial-literacy-debate_b_4459311.html

reasons. First, the state innovation policy influence on technology transfer is a complex phenomenon and would be reasonable to be examined within its context. State decision making results in forces on an extended range of actors of the economic cycle of Fintech sector. Second, the already existing knowledge body would not be sufficient to test and confirm casual questions. Thus, exploratory case study approach would be more suitable than the explanatory one. Multiple case study approach is chosen because of the need for theoretical replication, to foresee contrasting results for predictable reasons. To ensure multiple case study structure logic, the suggested guidelines for exploratory multiple case study research by Yin (2009) are closely followed.

To explore the challenges presented above, the mix of quantitative and qualitative research methods is used. Data collection for the exploratory case study is divided into two phase. I. - Gathering facts and data regarding the economic, innovation and policy contexts for both cases from various reports, research did previously and from strategic documents of government innovation policy. II - Based on the data collected in the first phase, for each case interviews with government officials, Fintech sector startups, traditional commercial banking representors and investors.

Table 1.1 Characteristics of the interviewees

	Category	Georgian case - No. of interviewees (persons)	Estonian case - No. of interviewees (persons)
Government	Innovation agency official	1	1
	Supervisory agent official	1	1
Major Fintech actors	Fintech start-up	2	2
	Commercial bank	2	2
	Investor	2	2

The focus of the questions for all interviewees were mostly the influential factors for facilitating entrepreneurship in the Fintech sector, how different actors see state role in enabling innovation and what they assume as the most prior actions from governments. For an illustration of the influential factors in developing entrepreneurship in the Fintech sector, interview aims to identify and analyse the conditions promoting and hindering Fintech industry and how the state innovation policy could steer this development process.

The data collected via interviews will be described with the help of casual loop diagrams to follow the system dynamics approach. System dynamics is a modelling technique used to

illustrate complex system behaviour. (Forrester, Industrial Dynamics, 1968) It combines various measures needed to identify crucial cornerstones of the systems in a wide variety of fields: management, economics, medicine, engineering and, etc. The system dynamic modelling could be useful because it is based on reliable parts of understanding of the system while compensating tricky parts. What is more, in the dynamic analysis consideration of underlying assumptions are separated from implied behaviour. (Forrester, 1991) According to Sterman (2002) system dynamics is designed to arrange high-leverage policies for continuous advancement and catalyse successful application and change.

This method is of contemporary use for analysing complex nonlinear systems, it was developed in the 1950s and ought to solve the challenge of describing the systems structurally, illustrating a full variety of relevant, influential factors. Thus, it gives an opportunity to simulate various strategies and examine nonlinear changes. All possible dynamics could emerge from two major types of feedback loops - one would be positive loops also known as self-reinforcing and negative loops self-correcting. As an example of positive feedback loop could be used, for instance, the situation when the firm lowers the prices to gain better market position, competitors usually respond with the same, forcing the companies to push down the costs again. In other words, positive loops are all processes which generate their growth again. On the contrary, a negative feedback loop could be described as a representation of opposite change. The simplest example could be - the higher price of commodity lowers the demand, or greater production leads to lower prices. (Sterman, Learning in and about Complex Systems, 2000)

Casual loop diagram is the key to a modelling as mentioned above approach. To schematize the interactions, the diagram will consist of three main elements. I - arrows representing the casual relation of variables, where the starting point of an arrow constitutes to a cause variable, whereas end point represents the effect variable. II - signs representing the direction of the casual relation, positive feedback loop or negative, accordingly `+` and `-`. The sign `+` illustrates two factors changing in the same direction, and `-` sign means that two variables are changing in the different directions. (Kim, Jung, & Lee, 2011)

It could be noticed that the narrow focus of the research, on the one hand, provides a better understanding of the topic itself but on the other hand, poses the problem of extending the results to other cases as well. However, the results could differ from case to case, as various economic

and innovation policy context creates particular circumstances requiring specific challenges to be addressed, there could not be found one-size fits all solutions. Therefore, the results are less likely to be generalised to other countries, but it could provide hypotheses for the future research in Fintech sector for late-developing economies.

Limitations could be presented by the comparatively small number of interviewees, as far as, these figures might not represent the full picture of unified positions of the actors. What is more, Fintech sector is put on test solely, while, it could be more reasonable to examine the industry in relations to the other technology fields, as innovation does not happen exclusively.

The respondents of the interviews are representing government and non-government organisations. However, the results and data collected could not be generalised as, for instance, the position of the governments, because the interviewees refused to speak on behalf of state institutions and they stated only their subjective perspectives.

Chapter 3. Case study

3.1 - The case of Estonian Fintech sector

3.1.1 - Overview of the economic context

Demolishing trade barriers, balancing prices and wages, diminishing tax load and overall liberalisation of the markets has been a focus of Estonian reform policies in the early 1990s, as it was seen a common orientation for the whole socio-economic sectors in Central and Eastern European countries. (Lember & Kalvet, 2014) Estonian catch-up process with the developed, industrialised nations in regards to the economic growth and welfare starting from the early 90s was heavily influenced by new technology application and the knowledge transferred from the developed world. It could be determined that the foreign direct investments have massively triggered technology transfer, which has been effectively transformed in economic growth and has risen its economic efficiency. Overall, it could be said that Estonian economy has experienced positive development, tackling the challenge of sustainable macroeconomic balance was mostly based on traditional sectors such as wood and paper products, furniture, transportation and logistics, construction services, etc. The mentioned fields were dominating in both terms export share and the employment rate. (Tiits, Kattel, Kalvet, & Kaarli, 2003) What is more, Estonia appeared to be most specialised in these sectors, what brought about few threats. (Christensen, 2012) Despite the economic growth, Estonia`s competitiveness of industrial sectors has been decreasing over the 1990s. Specialisation in resource and labour intensive fields could bring about the threat of a lock-in to an average and low-income stage.

Despite the risks mentioned above, we have seen a steady progress of Estonia in catch-up process, which could be explained by focusing on ICT-centred industries. (Kalvet, 2007) In terms of policy adoption emphasising on Washington Consensus type of systems (Radnma-Liiv et al. 2011), where we could find close links to proximity to the Nordic countries which has resulted in minor government regulations, low corruption rate and permissive business setting (see Table 1.2 below).

Table 1.2 Governance Indicators (World Bank 2015)[13]

	Government effectiveness	Control of Corruption	Regulatory Quality	Rule of Law	Voice of Accountability
Estonia	83,2	87,0	92,8	86,5	85,2
Denmark	97,6	98,1	94,7	99,0	97,5
Finland	96,6	99,5	98,1	100,0	97,0
Sweden	96,2	98,6	97,1	99,5	99,5
Latvia	84,1	68,3	81,7	76,0	72,9
Lithuania	85,6	70,2	88,0	81,3	75,9
Georgia	67,3	72,6	78,8	65,4	55,2

The pre-conditions as mentioned above regarding welfare and economic growth led to the developments in catch-up (see Tables 1.3 bellow):

Table 1.3 World Bank overview of countries (2014)[14]

	GDP per capita	GDP growth (annual %)	GDP in billions	Employment in service (% in total)	Employment in industry (% in total)
Estonia	19,941,5	2,8	26,213	65,9 %	30,1 %
Denmark	62,425,5	1,7	352,296	78,1 %	19,2 %
Finland	49,914,6	-0,6	272,609	73,5 %	21,8 %
Sweden	59,180,2	2,6	573,817	79,0 %	18,5 %
Latvia	15,710,2	2,1	31,322	68,6 %	23,8 %
Lithuania	16,555,6	3,5	48,547	66,1 %	24,7 %
Georgia	4,429,7	4,6	16,509	39,1 %	10,0 %

According to the world economic forum, Estonia is the best-performing country in Eastern Europe and has been improving its overall ranking rapidly, (29th according in the 2015 year). Various indicators are promising to keep the development phase, for instance, Estonia has a robust competitiveness profile in regards to the efficiency and transparency of institutions (26th place); sound macroeconomic environment (20th place); highly-developed education and training system (20th place). Estonian human capital market is also considerably powerful than most of the countries in the region (11th place). Further development of Estonian competitiveness considers the following priorities: strengthening business sophistication and innovation, enhancing

[13] Available at: http://databank.worldbank.org/data/reports.aspx?source=Worldwide-Governance-Indicators#
[14] Available at: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

productivity. Raising standards in regards to the infrastructure which is not yet on the Western European level. (Forum, 2015)

3.1.2 - Overview of the innovation system and the policy context

The historical background of the two last decades shows that Estonian innovation policy has witnessed significant changes, from which three main phases could be stressed out. First stage - starting from the 1990s was a `no-policy` approach when after regaining the independence from the Soviet Union, the totalitarian socio-economic system began transformation in a liberal market-based economy. The second phase started the beginning of the 2000s when a more linear approach was prevailing. (Lember & Kalvet, 2014) The third significant change was partly caused by joining European Union (EU) and adopting new policies. It started in the mid-2000 and moved towards challenging innovation system failures. Moreover, a critical change could be dated by 2007, when Estonian parliament, the Riigikogu, implemented a new Public Procurement Act, which is perceived to be the end of harmonisation with EU regulations. (Vaske & Lember, 2009)

At the beginning of the 1990s diminishing and rethinking Soviet production system innovation policy was not supported by the distinct regimes or policy measures. The closure of Soviet industrial institutions was drastic and agile, whereas Estonian reforms in R&D were remaining significant losses in supply channels and consumption capacities. (Radosevic, 1999) (Drechsler et al., 2006) (Martinson, 2004) During the transition years to the market economy, the most fundamental challenge was raising the finance for R&D. However, during the mid-90s budget for research was not growing alongside GDP growth. The only proponents of innovation policy and R&D were scientists leading to the comparatively linear interaction between innovation performance and research discoveries. During this period, together with insufficient financing the threat of brain drain and lack of professional expertise among researchers was posing serious challenges for Estonian policy makers. (Martinson, 2004) The conditions as mentioned earlier were resulting in the limited number of R&D performing enterprises. Accordingly, the share of high-tech companies in export and the value-added sector in traditional production fields was also small. (Koch, et. al., 2007)

Starting from the early 2000s, European countries` understanding of the innovation policy and research has shifted towards the broader recognition of the knowledge and innovation-based development systems. As innovation became the focus of policy makers in the majority of EU

member countries, Estonian economic development was actively influenced by adopting new policy measures. (Soete, 2007) (Torok, 2007) Major changes in Estonian innovation policy is seen with the second phase of EU funding starting from 2007 when the funding was a part of the EU Cohesion Policy, in regards to the investments in growth and reducing unemployment. More and more emphasis was put on fixing innovation policy failures and facilitating private sector innovation. (Lember et. al., 2014)

The mid-2000s also could be characterised by the raising interest in demand-side approaches throughout the European Union level, public demand was perceived as a driver for innovation. (Edler & Georghiou, 2007) Public procurement of innovation was seen as the option to provide primary markets with new technology-intensive products. (Kok, 2004) However, so far, we saw that the mentioned development path failed to influence Estonian innovation system, which was and is biased towards more supply-side measures. Estonian policy focus was facilitating R&D through advancing competence centres, infrastructure development and providing grants for more active research and development. On top of it, yet the position of demand-side policy measures in European level was still weak. (Aho, 2006)

Already, during this period Estonia was seen to have the highest potential among Eastern European Countries for the catch-up. The argument was based on the Estonian absorptive capacity and the advanced generation of demand for innovation because of the strong banking system and well-developed stock markets alongside to high shares of FDI, meanwhile presenting weak R&D capacities mostly caused by lack of the business research expenditure and poor R&D patenting activities. (Karo, 2010; Radosevic, 2006)

The researchers proposed the challenge of putting more pressure and effort on increasing number of enterprises taking advantage from the innovation support instruments and R&D, to achieve an efficient cycle of research result transformation in new products and processes. (Reid & Walendowski, 2006) (Koch et. al., 2007) Another major challenge for Estonian innovation policy was to organise effective policy coordination throughout the whole government structure, based on the EU tendency towards the network-based governance. (Karo & Kattel, 2010)

It could be said that Estonian growth is mostly driven by the building competitive ICT sector. There could be seen attempts to brand Estonia as information society and E-state. According to the research and development strategy namely - `knowledge-baed Estonia` ICT

sector has been one of the three key areas for Estonian R&D. (Kalvet et. al., 2002) Putting a focus on the stated industry led to strong linkages among telecommunications, governmental structures, software developers, etc. (Kalvet, 2012) From the lessons from the past the R&D financing has been rapidly growing, compared to previous years. In 2014, government spending on R&D had accounted half of the total R&D. Alongside, enterprises have also contributed to R&D advancement with the results of the 2014 year 44% of the Estonian R&D was provided by the business sector, while ICT has been in the centre of these developments make its technology and knowledge intensive field. (Estonia, 2016)

All in all, during the last two decades' Estonian innovation system, has undergone considerable changes through the liberalisation and economic stability, in turn attracting a high amount of FDI. The focus of the research and development have been ICT sector related enterprises, and innovation policy measures could be characterised with more supply-side measures. The R&D expenditure rate is low than EU average, and effective allocation of the resources remains as one of the challenges for better performance and gaining system-wide positive impacts.

3.1.3 Analysis of the Estonian Fintech sector

It could be said that Estonian Fintech sector is quite developed, accounting over 40 start-ups from which one giant, already mature start-up company could be highlighted - Transferwise which funds have already accumulated roughly 116 million US dollars and five start-ups already passed global market challenges having funds accumulating few million US dollars. Also, emerging companies which are comparatively on early-stages of development. It would not be a surprise from a country providing the highest number of start-ups per person.[15] Also, big commercial banks and other financial institutions have roots in the Nordic countries and Germany.

As for commercial bankers` the greatest barrier was increasing regulations, limits and rules which were becoming more and more conservative. The adoption and restriction of anti-money laundering (AML) and tax payment discipline put additional pressure on big organisations being able to develop in-house innovation. As one of the respondents said - "the increasing regulatory requirements are making it hard to develop (or even keep at the current level) today`s

[15] Correlation of population and number of start-ups; see - http://www.startupestonia.ee/startups

innovation/comfort for the users". What is more, the regulatory framework is missing some laws which could enable more use of financial technologies, for instance, lack of rights in the active law - i.e. opening bank account remotely via video, changing consumer habits, etc. As the primary driver force, interviewees considered the dynamic regulations as mentioned above and cooperation among all counterparties.

As the most challenging issue for the state innovation policy was considered catch-up to innovation development phase, according to the respondents, contemporary Estonian regulations lag behind the global innovation trends and therefore hinder the innovation in Fintech. In addition, one obstacle for commercial banks in competition with emerging start-ups and already large companies was that banks have more regulations than other actors, which makes it hard to keep the global innovation pace. However, this has a positive side as well, keeping commercial banks` profile as the safest financial institutions. Partnerships and collaboration would be more beneficial for the sector as a whole. Standardisation of the financial institution obligations was considered as one of the urgent actions, accompanied with the consumer privacy issues.

According to Estonian Fintech start-ups the sector could be characterised with high barriers to entry, caused by increasing regulations and lack of cooperation between start-ups and Estonian Financial Supervision Authority (EFSA) as it was said - "their actions tend to protect more existing players than to encourage innovation and competition". The slow embracing of new financial products and services by dynamic regulations was an as a major obstacle. Multi-level `Know Your Customer`[16] regulations should be adopted as well to tackle safety challenges of the financial technologies and therefore, the overall safety of the financial sector in general. Start-ups tended to prefer more supply-side policy measures to be taken by the government, facilitating Fintech entrepreneurship with flexible regulations, particularly in the early stage of development, support university spinoffs, etc. Public procurement was a secondary need.

Not surprisingly, start-ups preferred more competitive environment to disrupt the sector, the assumption behind this idea was the low pace of transformation and change of traditional actors. What is more, the traditional actors could become obstacles for new entrants to the market, as it was proposed by one of the respondents - "they can create barriers, not cooperate, lobby

[16] Reducing possible risks regarding the clients via collecting a set of information about them, needed to assess consumer`s compliance to their future obligations.

against start-ups, etc. insurance companies are certainly doing it". As one of the most advanced Estonian Fintech start-up official states, the most urgent action to be taken is rethinking EFSA management.

Interviewees providing their assumptions from the government perspective, which again could not be considered as an official position of the Estonian government had slightly different challenges in mind. To begin with, one of the biggest problems for Estonian innovation system in general and in Fintech case is the small market. Therefore, the policy should be arranged in a way to prepare the start-ups for going global. All collaborative forces should facilitate start-up scaling. To achieve this goal, a set of changes should be made. Regulations were again the forefront issue, more liberal approach in AML which would lead to more competitive legislation adapting to the global market prospects, as one of the respondents stated - "Estonian legislation has to be competitive. Otherwise, it is impossible to get a breakthrough or compete with others in the international market". In addition, distance identification against machine should be allowed in AML, while, balancing between risk mitigation and allowing innovation was crucial not to harm privacy issues and consumer safety by easing the regulations.

One of the keynotes was employing big data as it was seen as a precondition of final Fintech disruption. Widening education and training programs and putting more pressure on big data related courses, adopting new tools and systems for big data analytics by the state were assumed to be crucial, as well. Public procurement was seen to stimulate the growth of the Fintech.

Estonian investors` perspective provided additional input to the factors mentioned above. The main challenge was to develop local direct investments, provide additional incentives for stimulating local investors. The barrier to the small domestic market was seen as an obstacle for Fintech and governments` role was to support and supply start-ups with the set of resources and regulations to strengthen their competitiveness in the global market. Regarding the preferences between partnerships and individual companies, Estonian investors did not express a tendency to either of them. The main emphasis was put on the global competitiveness, and future perspectives as the local market would not be enough for investment attractiveness, regardless the type of companies.

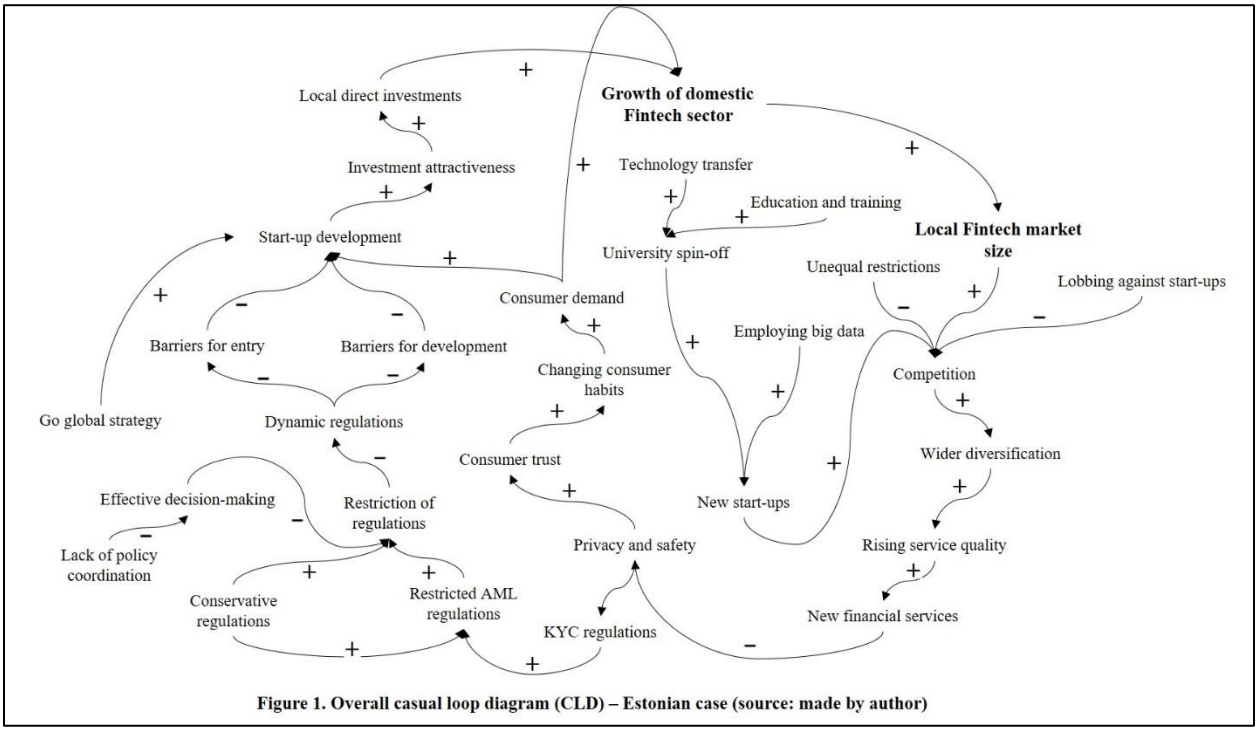

Figure 1. Overall casual loop diagram (CLD) – Estonian case (source: made by author)

3.2 - The Case of the Georgian Fintech Sector

3.2.1 - Overview of the economic context

Straight after the Soviet Union collapsed, together with regaining independence, Georgia began the transition to a more liberal economy, trying to reduce barriers to foreign trade, lower the tax rates, etc. as it could be seen all post-soviet member countries. (Gegeshidze, 2011) The biggest challenge and characteristic of Georgian economic system back then was to create, on the one hand, the basis for a market economy and on the other, create institutions who would execute the first goal. Which in turn was making the process more complicated than just tackling the first task. (see Papava 1996, Vol. 8; Vol. 20) The catch-up process for Georgia has been failed in the 1990s. The reasons for the severe economic crisis was the loss of former Soviet Union market on which Georgia was heavily dependent. The 1990s-economic shock and the high inflation rate have resulted in about 80% of GDP loss from 1990 to the 1994 year. (Papava, 1996a) During this period Georgia was specialising in traditional fields such as agro-industries, natural resources, textiles, etc. With disappearing the export market most of these fields have been disappeared as well. On top of it, the war in Abkhazia has brought about additional economic costs. (Papava, 1995)

After severing, the 1990s started new development phase in the mid-2000s. However, the reforms carried out to shift the economy to a market-based failed again. The reasons for lagging behind was the targeted projects, and narrow reforms which have not been coordinated and harmonised, the feeling of complex view of development was still missing. (Papava, 2013)

The 2000s were characterised by high openness to trade. The export product mix has been highly concentrated putting pressure on the need to diversity, as Georgia has been experiencing persistent negative trade balance and specialisation only in low technology-intensive fields, leaving little space for innovation. The majority of the population was self-employed in the informal sector with a low rate of entrepreneurship. The low level of research and development expenditures both in private and public sector brought about the results where roughly 90% of firms did not have R&D expenditures for previous five years in 2011. (Kuriakose, 2013)

The results of policy mistakes we see Georgia today according to almost all indicators is bellow EU average. (see Tables 1.2; 1.3) According to the Global Competitiveness Report 2015-2016 Georgia is in 123 places in ranking regarding the innovation pillar, far behind EU average. The explanation for this could be the fact that contemporary state innovation policy exists only starting from the 2014 year when the Georgian government started to pay more attention to the role of the technological development and advancing start-up ecosystem.

3.2.2 - Overview of the innovation and the policy context

It could be said that Georgian innovation policy as such is quite young. There might be stressed out two noticeable phases of development of Georgian national innovation system. I - after regaining independence in 1990s dramatic economic and industrial downturns, deindustrialization. Georgian industrial policy in the early 1990s inherited some negative characters of Soviet Union industry such as for instance, obsolete technologies; non-export oriented products. (Beridze & Papava, 1997) The first phase could be characterised with the attempts of adopting Washington Consensus principals, reforms required for European integration, thus overcoming poverty, solving regional backwardness and other issues which were seen to be dependent on successful innovation policy. What we have seen so far is reduced expenditures for research activities down to 0.1% of GDP during 1993-2012. (Partnership, 2013)

As a result of the two wars and a wide range of economic problems mentioned-above, Georgia has not experienced a significant amount of FDI and has been unable to solve the state policy challenges. One could highlight the mid-2000s when ICT sector became a focus for government. This period could be characterised in developing a set of reforms and incentives to stimulate ICT market including infrastructure, empowerment various actors and diminishing the barriers by making the legislative framework more dynamic. What is more, the first government web portal was created to act as a gateway to Georgian electronic governmental services the primary goal was to develop citizens` interaction with various electronic services and raise the tech-literacy together with making the government services more flexible and reduce governance costs and on top of everything, stimulate innovation. (Cluster, 2014)

National innovation policy as such did not exist until the 2012 year, before this period there could be seen various industrial projects but not a unified strategy, therefore the local projects were executed more in an unintended manner. What is more, the activities were fragmentary and often contradictory to each other. (Adeishvili & Terk, 2016) It could be said that after 2012-year new era started for Georgian innovation system. New development stage could be related to the new winner party in parliamentary elections. The government of Georgia started to pay more attention to the importance of the innovative development. In the beginning, the new party started implementing individual activities directly challenging national innovation policy issues, what brought about the need for a strategic plan of innovation development. Georgia had few options what kind of development plan to choose, it will be discussed below. However, from EU recommendations the highlighted reforms could be stressed out which could be characterised by more supply-side perspectives. The focus was strengthening the research system and raising the expenditure percentage on R&D in GDP; development of incubators and technoparks; establishing advisory services in agriculture to upgrade the productivity of the sector; building technology transfer centres and building networks. (Partnership, 2013)

As we have stated above, a new era of Georgian national innovation system, thus, the transition process towards to the knowledge-based and innovation-driven economy started with individual activities and soon in the 2014 year it has been translated into a comprehensive strategy for innovation development. Innovation support has been institutionalised, and the first Georgia`s Innovation & Technology Agency (GITA) has established under the Ministry of Economy and

Sustainable Development. The primary objectives of the agency are innovation policy implementation and elaboration. GITA also aims to facilitate entrepreneurship at all levels through providing innovation infrastructure: tech parks, innovation laboratories, incubators, accelerators, fabrication laboratories (fablab), etc. The establishment of GITA was followed by creating Research and Innovation Council which involves a broad range of actors such as the ministers, scientists and private sector representatives.

What is more, GITA is the secretary of the council, and the goal of creating council is active high-level decision making and policy coordination. (Agency G. I., 2016b) The development reforms consist of 4 main elements accordingly - I. Infrastructure for Innovation: Innovation centres, regional innovation hubs, rural broadband connectivity; II. Innovation services: building the innovation community, skills development for jobs, business innovation support; III. Start-up and innovation matching grants, matching grant and administration, innovation financing policy; and IV. Project management. The reform strategy is being executed, and there are seen many positive incentives, for instance in the 2015 year during international fablab conference Fab11 Georgia has been nominated as `world`s FabCountry'[17]. (Agency G. I., 2016a)

GITA also provides legislation projects regarding the regulatory framework for innovation. The first phase of reform was regulatory framework package including a law on innovation concerning law on grants, tax code, and etc. The second step is ought to be concerned to venture financing, crowdfunding regulations and etc. (Agency G. I., 2016a)

It could be said that contemporary Georgian innovation system could be characterised by notable government leadership of the innovation ecosystem. The argument behind this assumption is the fact that the fablabs, tech parks and other infrastructure are all state owned. Besides of technical facilities, GITA (state) is providing different R&D projects, grants, acts as a mediator between entrepreneurs and investors, provides a broader range of training and workshops. Executing start-up idea competition and providing resources for start-ups almost in all development stages. Whereas, universities and other non-governmental research organisations lag

[17] Meaning the disruption of manual work methods, implementing high technology and developing innovative hardware start-ups.

far behind compared to the agency facilities and resources, what could bring about the risk of weak technology transfer systems and lack of interactions between university research and business.

3.2.3 - Analysis of the Georgian Fintech sector

The Georgian Fintech sector, as in general innovation system and a wide range of local start-ups, is quite young. It accounts only three Fintech start-ups from which all of them are in the validation[18] or the formation[19] development phase.

According to the Georgian government officials` perspective, which again could not be perceived as a position of the government itself, regulations stand as a core of both drivers and barriers. Here is meant that as for now, the regulations might not be proper in meeting the emerging market prospects which create obstacles for enabling Fintech, accordingly, solving the challenge of dynamic laws could become a driver.

To go more in detail, there could be seen two major problems. First, there are difficulties with distance identification of the consumer in Georgia, which leads to the obstacles with the legitimization of the Fintech transactions. Second, even the technologies adopted by traditional banks have not rooted in market transactions, for example, the internet and mobile transactions are not widely accepted by a wide range of organisations, such institutions tend to prove only paper-based documents. As the supervisory agent states - "It is crucial to identify and analyse the risks which could constitute Fintech, the need for more regulations is obvious, but it should be adequate of the risks, a state should safeguard its citizens from possible threats". In the potential hazards, the later considers personal information safety, illicit affairs from organisations while making the transactions, etc.

Innovation agent has revealed the need for some supply-side policy measures such as providing the sector with various educational and training programs, raising overall tech and financial literacy among consumers. Also, offering incentives for public and private partnerships, to make the process of establishment in the market easier for the start-ups. The major, traditional actors of the financial sector are foreseen as - "shaping the demand in the market, and the majority

[18] Created minimum viable product which is tested with potential consumers and collecting the feedback for further development.
[19] The earliest phase of start-up development. Formation of - mission, vision and strategy

of financial and intellectual resources accumulate around them". The interesting assumption was provided regarding the enabling the Fintech via dynamic regulations, while not harming traditional financial actors. This idea was referring to prospects as recently we have seen Fintech start-ups and other organizations providing technology-based financial services as it has been done by banks, but they are not as restricted by regulatory institutions as commercial banks.

Full liberalisation is considered as the most favouring state of the economy and innovation policy as well. However, the need for considerable interventions was perceived acceptable at the early stages of development, demand-side policy measure - public procurement was recognised as one of the examples for fostering and stimulating yet very young Fintech sector in Georgia. The most prior aspect requiring reanimation for both parties was rising tech-literacy level; for regulators perspective, secondary priorities were financial safety and regulations; for innovation policy agent, the secondary aspect was developing market demand. Surprisingly, the need for more public demand and adoption of new financial technologies was perceived of the least importance for both interviewees.

The commercial bank officials also emphasised on weak tech and financial literacy, resulting in the lack of trust and awareness, which is partly caused by the poor absorption of Fintech by both public and private organisations. Wider adoption and use of the financial technologies in public services is considered as one of the most crucial policy actions from governments, moreover, both interviews emphasis on the need for unified open dataset where all actors would have access. As one of the respondents said - "some documents required for analysing consumer`s solvency which is provided by the state institutions require 3-4 working days, whereas in a case of the electronic database this process could be reduced to few minutes". Easing regulatory frameworks and providing reduced tax incentives for the R&D are believed as forefront factors of enabling in-house financial innovations in banks. Commercial banks are considered as a key player of the Fintech in Georgia; their openness is crucial for enabling innovation, they tend to be attracted by the idea of partnerships with new start-ups. Without willing for changes banks could become a barrier for new entrants in the market, it is perceived as an only way for disruption of Fintech. In addition, addressing cyber security issues and adoption of crowdfunding regulations are also one of the most important matters.

Only start-ups emphasized on developing infrastructure, wider IT education and attracting more venture capital funds, not only FDI but encouraging local businesses to invest as well. What is more, they determined weak and unstable bureaucratic processes and lack of communication with actors of the Fintech. From the driver factors, they stressed out untapped market space; there is a wide range of services that could be provided by the Fintech start-ups. Accurate interventions from governments are perceived necessary, as Georgian Fintech sector is very young, some actions from state institutions are crucial in enabling more innovation. As one of the respondents said - "we are not against operational interventions which in long-run would lead to more liberalised market, examples for such actions could be - putting pressure on organisations for sharing their information widely to other actors of the system." The most prior cornerstone for development was using big data for unified database making the information, the most valuable asset of the contemporary world, accessible to everyone, adopting regulations alike PSD2[20] directive and in general taking into account the international perspectives for Fintech regulations. Start-ups drew our attention to the influential power of commercial banks in Georgia, on the overall financial market and on policymakers as well, directly and indirectly, therefore, one idea to be involved in policymaking was solved by creating a working group consisted of various actors of Fintech.

According to the investor`s perspective macroeconomic stability would lead to the state where investors feel safer to invest and therefore willing to do so. Additional stimulating factor would be special tax regimes and tax reduction. Lack of strategic planning was one of the obstacles for Fintech development. Partnerships were preferable types of organizations or projects to invest in as investors trust in established large traditional actors of the system and governments as well. The most crucial aspects of development for investors appeared to be reduced regulations and financial safety.

[20] Payment Service Directive - adopted in European Union; antimonopoly regulation for banks` consumer account information and payment services; see. https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366_en

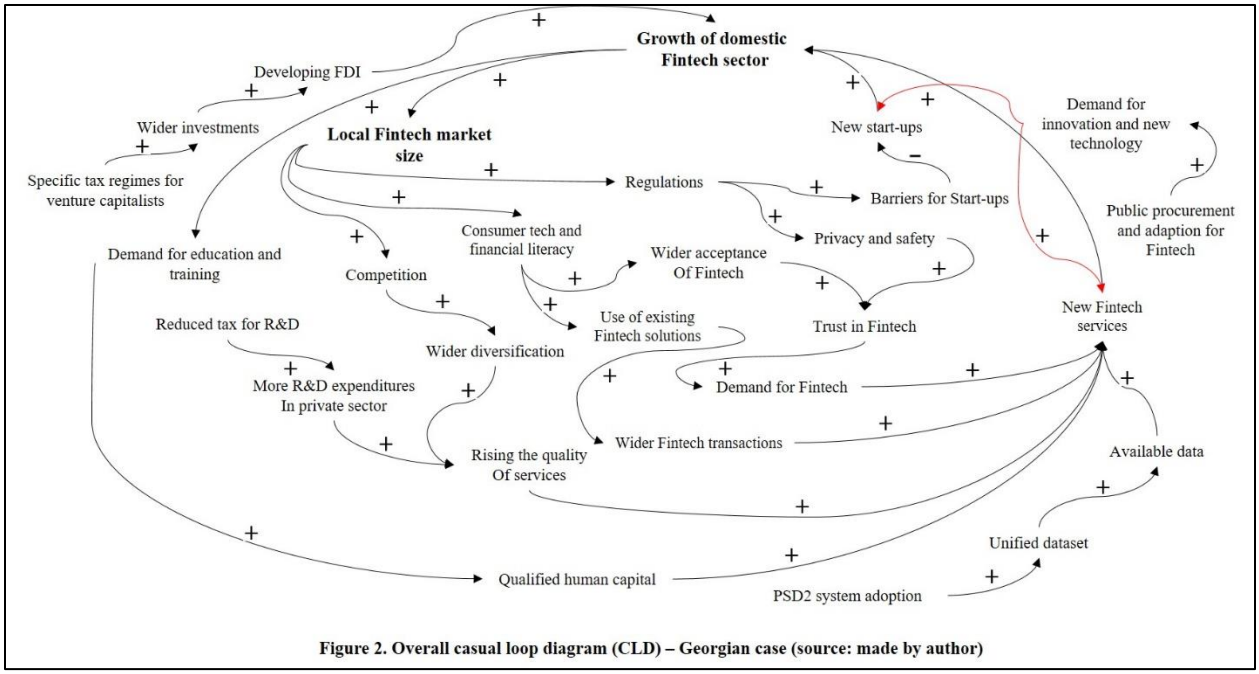

Figure 2. Overall casual loop diagram (CLD) – Georgian case (source: made by author)

Chapter 4. - Discussion

The review of the conceptual background for the research topic revealed overall barriers and drivers of the Fintech sector, in general. What is more, the theoretical part provided an overview of the state innovation policy toolkit from which governments are choosing specific measures and set of instruments for tackling various challenges. In addition, the possible innovation policy instrument choice was discussed in the paper. Utilisation of the information provided in theoretical part was applied to the selected cases. The primary research - the interviews showed that various influential theoretical factors match with the elements from the certain cases. The interviews built in a way to give full freedom to interviewees in their assumptions and the attempts to reduce factors which could limit and direct the answers to any possible direction, provided a set of indicators based on which we could stress out various results and policy recommendations.

To begin with, it could be said that the hypothesis provided earlier in this paper is proved to be true for the proposed two cases. Accordingly, innovation policy measures having indirect influences on the Fintech sector show better performance in the developing economies than those having direct effects is true for Estonian and Georgian cases. The key drivers and barriers for the Fintech sector have been identified as mentioned above both in theory and in practice, for both cases. The research showed that the influential factors could vary for the two cases studies. This assumption is based on both primary and secondary research results.

The overview of the Estonian innovation and policy provides evident that it is experiencing mostly supply-side policy measures, which could be referred to the indirect effects on the Fintech sector. Whereas, the research on Georgian innovation system and policy revealed proof that it is experiencing more demand-side policy measures mixed with supply-side ones and it could be referred to the innovation policy effects having more direct influences on the Fintech sector. The analysis of the figures (see tables 1.2; 1.3) regarding the economic performance and overall competitiveness shows that Estonia much more developed than Georgia. While Estonia is

considered as one of the most innovative countries, Georgia lags behind with its quite young national innovation system.

To provide more arguments for our hypothesis, we should take a look at the extracted parts from the casual loop diagrams for both cases and analyse main differences.

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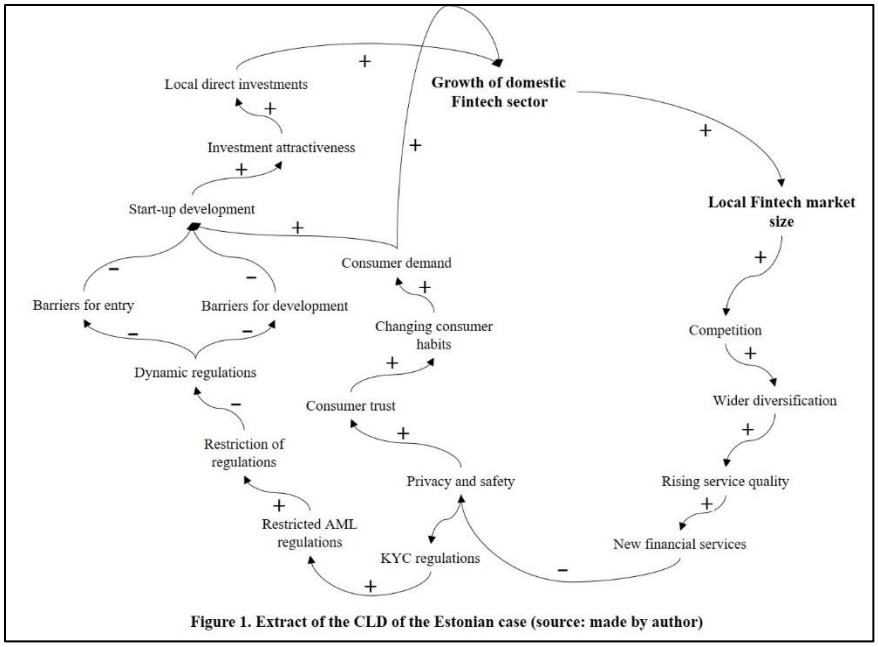

Figure 1. Extract of the CLD of the Estonian case (source: made by author)

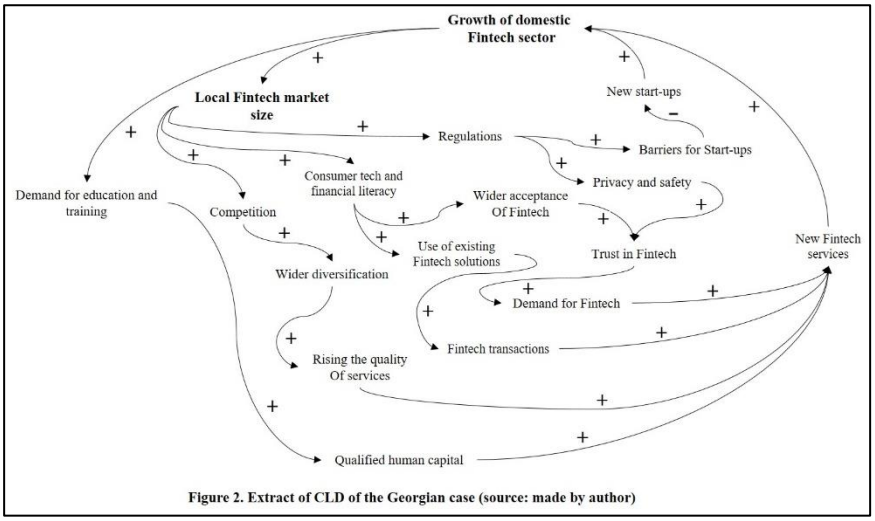

Figure 2. Extract of CLD of the Georgian case (source: made by author)

As we can see, despite the similarities, for instance, the importance of the regulatory framework, in the extracted casual loop diagrams could be seen considerable differences. The fact that the Estonian Fintech sector is more developed besides the number of start-ups and their

capitalization proves the presented policy aspects which could be stressed out from the diagrams. In the Estonian case, such factors as the trust in Fintech innovation and new technology-based services, tech and financial literacy, acceptance of the Fintech transactions, qualified human capital and the lack of use of the already existing high-tech financial services is not presented. Whereas, these issues are ones of the most fundamental challenges to be tackled by the Georgian government. It could be explained by the Estonian policy which has been orienting on these challenges back from the early 1990s and has been developed up to the given level as a result of which citizens of Estonia are considered as one of the most tech-savvy people, open for adapting to the new technology-based services.

The challenge for Estonians, in this case, is legislation which is missing some rights in the active law which could allow legal use of various technologies. The most important challenge i.e. regulatory framework is mutual for both cases. However, some differences could be stressed out regarding the regulations as well. While interviews in Estonian has shown, rules should change in a way to catch-up with global market prospects and strengthen the competitiveness of the Fintech start-ups in regards to the global world; the Georgian Fintech sector struggles to produce local start-ups and develop early-stage entrepreneurship.

What is more, the Estonian Fintech actors review big data issues and see the future of the sector in developing and adopting big data systems through remaining privacy and safety issues, whereas Georgian policy-makers should work on developing the standardised datasets to make accessible the information owned by the companies and the governments to all actors. In both cases, liberal markets are the point where state innovation policy should head to, nevertheless, in Georgian case considerable rate of interventions are accepted, from both sides governments and Fintech actors, at the early stages of the Fintech development. The idea behind these interventions is speeding up the development process.

Although, it could be noticed that as we have seen from the theory, direct influences and interventions could show some developments in performance in the short-run there could be the risk of sustainability of the progress. Estonian case indicates that none of the actors is favouring state interventions and this has been proved over last few decades. In Georgian case, it could not be determined interventions will prove itself or not, as it requires time to be examined, if we take

into account the fact that new era of Georgian national innovation system has started over five years ago it would be early to speak from the long-run perspective.

The contradictory assumptions regarding the ease and widening regulations have been revealed in both cases. The challenge of balancing between regulations and enabler factors for the Fintech Innovation is mutual for both - Estonian and Georgian Fintech sector. The differences could be caused by the contradictory character of the industry itself, on the one hand, it needs more regulations to cover the fields which are not regulated, on the other, needs to ease the rules to enable innovation.

As we have mentioned the development stage of the Georgian Fintech sector and the national innovation has emerging character. It should be noted that Georgian NIS is very young could limit the validity of the results provided by the research. The performance of Estonian Fintech sector could be a product of the few decade of rapid development of the innovation system. The strategies of development are different in both cases; however, specific socio-economic contexts are different as well, which could pose limits while talking on sustainable development in the long-run.

The interview-based research could be further developed by adding more actors, for instance, the consumer survey could provide more evident for what are the end-users` need and demand. It should also be acknowledged if the number of the selected interviewees would be bigger the results could provide more evidence for the final conclusions. In addition, more quantitative data could make the results more robust.

In the future study, it would be reasonable to test the hypothesis in more cases of developing economies and in various innovation policy cases. Additionally, more quantitative methods could accompany the casual loop diagram proposed in this study.

Chapter 5. - Conclusion

The paper focused on the state innovation policy challenges in the Fintech sector. Firstly, the theoretical basis for the major barriers and drivers have been identified. Accordingly, state innovation policy toolkit has been overviewed, and its implications have been examined about the proposed cases. Thus, the presented research contributes to the literature by explaining which challenges are the most critical in Fintech sector and what are the possible ways of improving the innovation policies favouring and enabling innovation in the Fintech sector based on the Georgian and Estonian cases.

Table 1.4 - Summary of the key issues in the Fintech sector[21]

	Estonian case	**Georgian case**
Government	• Wider anti-money laundering regulations, • Privacy and safety;	• Terminating Illegal financial affairs, • Education and training,
Major Fintech actors	• Ease of restrictions in AML and KYC regulations, • Developing local direct investments, • Changing consumer habits, • More rights in the active law;	• Rising consumer tech and financial literacy, • Rising human capital qualifications, • More public procurement and adaption of the Fintech solutions, • Wider acceptance of the Fintech transactions;

The paper identified the most important keynotes of the Fintech development for both cases separately and depending on these results compares the two cases. The summary of the key issues provided above illustrates the casual feedback loops for the both cases, extracted from the CLDs of Georgian and Estonian cases.

The research concludes that innovation policy actions having indirect influence (illustration of the Estonian case) on the Fintech sector show a better overall performance than the

[21] Source - made by author

ones having direct effects (the example of the Georgian case). Furthermore, it finds that the important aspects could vary across different cases as the policy and economic discrepancies produce various policy challenges.

In addition, the study analyses the casual relationship between drivers and barriers of the Fintech sector and the state innovation policy, based on the interviews with various interest groups. To provide more realistic results, in all cases the interviews were executed with the respondents being a representor of the higher management chain.

However, further research could be done by applying the methods and the provided theories and concepts to the wider range of cases. It would be reasonable also to add more quantitative data to the research to create a more solid basis for the results.

Bibliography

Accenture. (2016). Fintech`s Golden Age. *FinTech innovation Lab; available at: https://goo.gl/v9KjxZ*.

Adeishvili, D., & Terk, E. (2016). Challenges for Industrial Policy in Georgia. *Freidrich-Ebert-Stiftung*.

Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2014). Predatory lending and the subprime crisis. *Journal of Financial Economics; available at: http://www.ushakrisna.com/2401.pdf*.

Agency, G. I. (2016a). *Newsletter - Fats of the Year 2016.* Tbilisi: GITA, available at: www.gita.gov.ge.

Agency, G. I. (2016b). National Innovation Ecosystem in Georgia. *Ministry of Economy and Sustainable Development of Georgia*.

Aho, E. (2006). Creating an innovative Europe. *Report of the Independent Expert Group on R&D and Innovation; European Commissions; available at: https://goo.gl/g9BPSh*.

Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of FinTech: a new post-crisis paradigm? *The HKU Scholars Hub; The University of Hong Kong; available at: https://goo.gl/YWh6tl*.

Arrow, K. (1962). Economic Welfare and the Allocation of Resources for Invention. *Princeton University Press*, 616-620.

Autio, E., & Laamanen, T. (1995). Measurement and evaluation of technology transfer: Review of technology transfer mechanisms and indicators. *International Journal of Technology Management* , 646-653.

Bank, E. C. (2016). *Financial Integration in Europe.* European Central Bank - Eurosystem; available at: https://www.ecb.europa.eu/pub/pdf/other/financialintegrationineurope201604.en.pdf.

Barberis, J. N. (2012). The 2007 Meltdown: A Legal Phenomenon. *The University of Hong Kong; available at: https://goo.gl/Y3o76y*, 20-34.

Beridze, T., & Papava, V. (1997). Industrial Policy and Trade Regime in Georgia. *Eurasian Studies, Vol. 3*.

Bozeman, B. (2000). Technology transfer and public policy: a review of research and theory. *ELSEVIER*, 629-635;.

Buckley, R. P., & Malady, L. (2015). Building consumer demand for digital financial services - the new regulatory frontier. *The Journal of Financial Perspectives: FinTech; Vol. 3; Issue 3; available at: file:///C:/Users/Charchila/Desktop/building-consumer-demand.pdf*, 1-36 (10).

Chiu, I. H.-Y. (2015). Fintech and Disruptive Business Models in Financial Products, Intermediation and Markets-Policy implications for Financial Regulators. *Journal of Technology Law & Policy Vol. 21; available at: https://goo.gl/FPEhRN*.

Choi, Y. R., & Phan, P. H. (2002). A generalized supply/demand approach to national entrepreneurship: Examples from the United States and Korea. *Academy of Management Meetings; available at: https://goo.gl/OCbTqS*.

Christensen, T. A. (2012). Peer-Review of the Estonian Research and Innovation System; Steady Progress Towards Knowledge Society. *Expert Group Report Prepared for the European Research Area Committee; available at: https://goo.gl/DBa2Me,* 7-20.

Cluster, E. C.-E. (2014). *ICT Environment, Innovation Policies & International Cooperation in Georgia.* East-Horizon FP7 Project, grant agreement No. 611063; available at: http://eeca-ict.eu/countries/georgia.

Consulting, C. (2017). *World FinTech Report.* Available at: https://www.se.capgemini-consulting.com/sites/default/files/world_fintech_report_wftr_2017_final_web.pdf.

Czarnitzki, D., & Toole, A. A. (2006). Business R&D and the Interplay of R&D Subsidies and Market Uncertainty. *ZEW Discussion Papers, No. 06-55; available at: https://www.econstor.eu/bitstream/10419/24510/1/dp06055.pdf*.

Das, S. (1987). Externalities, and technology transfer through multinational corporations A theoretical analysis. *Journal of International Economics*, 171-179.

Drechsler, W., Reinert, E. S., Kregel, J., Kalvet, T., Kattel, R., Burlamaqui, L., & Backhous, J. G. (2006). Creative destruction management: meeting the challenges of the techno-economic paradigm shift; available at: https://goo.gl/vqWzKn. *Praxis Centre for Policy Studies*, 15-30.

Edler, J., & Georghiou, L. (2007). Public procurement and innovation - Resurrecting the demand side. *Research Policy 36; Available at: http://dimetic.dime-eu.org/dimetic_files/EdlerGeorghiou2007.pdf*, 954-961.

Edquist, C., & Borras, S. (2013). The Choice of Innovation Policy Instruments. *CIRCLE ,Paper No. 2013/04, Lund University; available at: http://wp.circle.lu.se/upload/CIRCLE/workingpapers/201304_Borras_Edquist.pdf*.

Edquist, C., & Hommen, L. (1998). Government Technology Procurement and Innovation Theory. *Linkoping University; Available at: https://goo.gl/yqI10Y*, 5-14.

Edquist, C., & Zabala-Iturriagagoitia, J. M. (2012). Public Procurement for Innovation as mission-oriented innovation policy. *Research Policy, Available at: https://goo.gl/1vMtnE*, 1757-1769.

Edquist, C., Tsipouri, L., & Hommen, L. (2000). Public Technology Procurement and Innovation. *Springer Science Volume 16; Available at: https://goo.gl/I1TUwK*, 5-27.

Estonia, S. (2016, Accessed April 2017). *http://www.stat.ee*. Retrieved from http://www.stat.ee: file:///C:/Users/Charchila/Desktop/Minifacts_about_Estonia_2016.pdf

Feldman, M. P., & Florida, R. (1994). The Geographic Sources of Innovation: Technological Infrastructure and Product Innovation in the United States. *Annals of the Association of American Geographers, Vol. 84, No. 2*, 210-229.

Foray, D. (2005). Generation and Distribution of Technological Knowledge: Incentives, Norms and Institutions . In C. Edquist, *Systems of Innovation: Technologies, Institutions and Organizations* (pp. 65-75). London: Routledge.

Forrester, J. W. (1968). Industrial Dynamics. *Management Science Vol. 14; available at: https://goo.gl/RIxwB7*, 398-415.

Forrester, J. W. (1991). System Dynamics and the Lessons of 35 Years. *Cambridge - The MIT Press; availabe at: https://goo.gl/vOGC5m*.

Forum, W. E. (2015). The Global Competitiveness Report 2014-2015. *Available at: https://goo.gl/M0Pwnt*.

Gegeshidze, A. (2011). Georgia`s Political Transformation: Democracy in Zigzag. In F. E. Stiftung, *South Caucasus 20 Years of Independece* (pp. 25-41). Friedrich Ebert Stiftung.

Gibson, D. V., & Sung, T. K. (2000). Knowledge and Technology transfer: Levels and key factors. *The University of Texas*, Available at: https://goo.gl/S77ZUI.

Glas, A., & Truszel, M. (2016). Current Trends in Financial Technology. In S. Chishti, & J. Barberis, *The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries* (pp. 13-30). Chichester: TJ International Ltd.

Habib, D. S. (2013). Financial Inclusion and Development Central Banking: The Experience of Bangladesh. *Alliance for Financial Inclusion; available at: http://bea-bd.org/site/images/pdf/043.pdf*.

Hussinger, K. (2003). R&D and Subsidies at the Firm Level: An Application of Parametric and Semi-Parametric Two-Step Selection Models. *ZEW Discussion Papers, No. 03-63; available at: https://www.econstor.eu/bitstream/10419/23997/1/dp0363.pdf*.

Institute, T. J. (2015). Who will disrupt the disruptors? *Winter 2015 FinTech; available at: https://goo.gl/YgXEwV*.

Kalvet, T. (2007). The Estonian Information Society Developments Since the 1990s. *Praxis Working Paper No. 29; available at: https://goo.gl/1OFIEz*.

Kalvet, T. (2012). Innovation: a factor explaining e-government success in Estonia. *Electronic Government, An International Journal, Vol. 9, No.2*.

Kalvet, T., Pihl, T., & Tiits, M. (2002). Analysis of the Estonian ICT Sector Innovation System. *Executive Summry. Archimedes Foundation; available at: https://goo.gl/tMiEKq*.

Karo, E. (2010). Improving Governance of Science and Innovation Policies, or Just Bad Policy Emulation? The Case of the Estonian R&D System. *Halduskultuur - Administrative Culture 11 (2); available at: https://goo.gl/3SKWUZ*, 173-201.

Karo, E., & Kattel, R. (2010). The Copying Paradox: Why Converging Policies but Diverging Capacities in Eastern European Innovation Systems? *International Journal of Institutions and Economies*, 167-206.

Kattel, R., Lember, V., & Kalvet, T. (2013). Public Procurement and Innovation: Theory and Practice. In R. kattel, V. Lember, & T. Kalvet, *Public Procurement, Innovation and Policy* (pp. 13-31). Berlin: Springer-Verlag Berlin Heidelberg.

Kim, H.-W., Jung, G.-Y., & Lee, J.-E. (2011). An Exploratory Study of the IPTV Business in Korea: Issues and Suggestions for the Success. *The Journal of Information Systems vol. 20; available at: https://goo.gl/3evUff*, 23-47.

Koch, P., Polt, W., & Wolters, A. (2007). Evaluation of Estonian RTDI Policy Mix. *Results of OMC Peer Review Report: Country Report for Estonia; available at: https://goo.gl/RUOM84*.

Kok, W. (2004). Facing the Challenge: The Lisbon strategy for growth and employment. *European Communities: Report from the High Level Group chaired by Wim Kok; available at: https://goo.gl/uHTmyV*, 18-33.

Kumar, V., Kumar, U., & Persaud, A. (1999). Building Technological Capability Through Importing Technology: The Case of Indonesian Manufacturing Industry. *The Journal of Technology Transfer*, 81-89.

Kuriakose, S. (2013). Directions in Development - Private Sector Development. In S. Kuriakose, *Fostering entrepreneurship in Georgia* (pp. 1-6; 15-20). Washington, D.C. : The World Bank.

Lember, V., & Kalvet, T. (2014). Public Procurement, Innovation and `No Policy` Policy - Estonia. In V. Lember, T. Kalvet, & R. Kattel, *Public Procurement, Innovation and Policy* (pp. 127-146). Berlin: Springer.

Lerner, J. (1999). The Government as Venture Capitalist: The Long-Run Impact of the SBIR Program. *Journal of Business 72(3); Available at: http://enterprise-europemalta.com/Portals/0/documents/SBIR.pdf*, 285-294.

Leydesforff, L., & Besselaar, P. V. (n.d.). Competing Technologies: Lock-ins and Lock-outs (William Brian Arthur`s model, 1988). *Pinter Publishers; Available at: http://www.leydesdorff.net/casys97/1997liege.pdf*.

Liu, C.-C. (2006). Modeling the transfer of technology to Taiwan from China. *Journal of International Business Research*, 24-26.

Lundvall, B.-A., & Borras, S. (1997). The globalising learning economy: Implications for innovation policy. *Commission of the European Union, Report based on contributions from seven projects under the TSER programme*.

MacKenzie, D., & Wajcman, J. (1999). The Social Shaping of Technology: How the Refrigerator Got Its Hum. *Open University Press; available in LSE Research Online - http://eprints.lse.ac.uk/28638/1/Introductory%20essay%20(LSERO).pdf*, 2-8.

Malerba, F. (2002). Sectoral systems of innovation and production. *Research Policy; Available at: https://goo.gl/EfMMVf*, 247-264.

Malerba, F., & Orsenigo, L. (1996). Schumpeterian patterns of innovation are technology-specific. *Research Policy; Available at: https://goo.gl/HoN216*, 451-478.

Martinson, H. (2004). Estonia: Transformation of the R&D System. In W. Meske, *From System Transformation to European Integration* (pp. 135-150). London: Transaction Publishers.

Metcalfe, S., & Georghiou, L. (1997). Equilibrium and Evolutionary Foundations of Technology Policy. *CRIC Discussion Paper No. 3, available at: http://debis.deu.edu.tr/userweb/sedef.akgungor/dosyalar/metcalfe.pdf*.

Milne, A. (2015). Achieving European Policy Objectives through Financial Technology. *ECRI Commentary No. 17; available at: https://goo.gl/luxSdl*.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organizational science*, 14-22.

Papava, V. (1995). The Georgian Economy: Problems and Reforms. *Eurasian Studies, Vol. 2*.

Papava, V. (1996a). The Georgian Economy: From `Shock Therapy` to `Social Promotion`. *Communist Economies & Economic Transformation, Vol. 8; available at: http://papava.info/publications/V_Papava_The_Georgian_Economy_From_Shock_Therapy.pdf*.

Papava, V. (1996b). Social Promotion of Economic Reform in Georgia. *Economic systems, Vol. 20;*, 305-314.

Papava, V. (2013). On the vector of economic development of post-communist Georgia. *Georgian Foundation for Strategic and International Studies*.

Partnership, E. (2013). Economic integration and convergence with the EU legislation - Innovation policy in Georgia. *Policy Paper - Working group 2; available at: http://www.eapnationalplatform.ge/admin/editor/uploads/files/publications/PP_short%20version_WG2_Innovation_ENG.pdf*.

Pavitt, K. (1985). Patent statistics as indicators of innovative activities: Possibilities and problems. *Springer*, 77-87.

Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, 79-92.

PricewaterhouseCoopers. (2017). *Global FinTech Report - Redrawing the lines: FinTech`s growing influence on Financial Services.* Available at: http://www.pwc.com/ee/et/publications/pub/pwc-global-fintech-report-2017.pdf.

Radnma-Liiv, T., Kalvet, T., & Kattel, R. (2011). Small States, Innovation and Administrative Capacity. *Innovation in the Public Sector; Springer; available at: https://goo.gl/kKF4hZ*.

Radosevic, S. (1999). *International technology transfer and catch-up in economic development.* Cheltenham, UK: Edward Elgar Publishing.

Radosevic, S. (1999). Restructuring and Reintegration of Science and Technology Systems in Economies in Transition. *Final report of TSER; Contact No: SOEI-CT95-1008; available at: https://goo.gl/VYAbbl*.

Radosevic, S. (2006). The knowledge-based economy in Central and Eastern Europe: an overview of key issues. In S. Radosevic, & K. Piech, *The knowledge based economy in Central and Eastern Europe: countries and industries in a process of change* (pp. 31-56). UK: Palgrave Macmillan.

Reid, A., & Walendowski, J. (2006). Evaluation of the design and implementation of Estonian RTDI policy: implications for policy planning. *Final Report - Technopolis Consulting Group Belgium SPRL; available at: https://goo.gl/oaNjlw*.

Rosenberg, N. (1984). Inside the Black Box: Technology and Economics. *Southern Economic Journal; Available at: https://goo.gl/7kLLQ1*.

Soete, L. (2007). From Industrial to Innovation Policy. *Journal of Industry, Competition and Trade; available at: https://goo.gl/KISWUa*.

Sterman, J. D. (2000). Learning in and about Complex Systems. In J. D. Sterman, *Business Dynamics: Thinking and modeling for a complex world* (pp. 10-39). Massachusetts, USA: The McGraw-Hill Companies.

Sterman, J. D. (2002). System Dynamics: Systems Thinking and Modeling for a Complex World. *Cambridge - MIT Sloan School of Management; available at: https://goo.gl/Ncdjpm*.

Thornton, P. H. (1999). The Sociology of Entrepreneurship. *Annual Review of Sociology, Vol. 25; available at: http://www.edegan.com/pdfs/Thornton%20(1999)%20-%20The%20Sociology%20Of%20Entrepreneurship.pdf*, 19-46.

Tiits, M., Kattel, R., Kalvet, T., & Kaarli, R. (2003). *The Estoian Economy - Competitiveness and Future Outlooks: R&D and Innovation Policy Review.* Tallinn: State Chancellery.

Torok, A. (2007). Industrial Policy in New Member Countries of the European Union: A Survey of Patterns and Initiatives Since 1990. *Journal of Industry, Competition and Trade; available at: https://goo.gl/umoJEV*, 255-271.

Vaske, V., & Lember, V. (2009). Public Procurement in Post-Transitioanl Context: The Case of Estonia. In K. V. Thai, *International Handbook of Public Procurement* (pp. 410-424). Florida: Taylor & Francis Group.

Veryzer, R. W. (1998). Discontinuous Innovation and the New Product Development Process. *Elsevier*, 304.

Wahab, S. A., & Rose, R. C. (2012). Defining the concepts of technology and technology transfer: a literature analysis. *International Business Research*, 62-64.

world, E. -B. (2015). *UK FinTech on the cutting edge - An evaluation of the international FinTech sector.* HM Treasury; available at: http://www.ey.com/Publication/vwLUAssets/EY-UK-FinTech-On-the-cutting-edge/%24FILE/EY-UK-FinTech-On-the-cutting-edge.pdf.

Yin, R. K. (2009). *Case Study Research: Design and Methods (4th ed.).* USA: Sage.