In Search of Self-Renewal Capacity

Defining concept and its theoretical framework

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Abstract

This paper adopts the point of view that a crisis will face a person, organisation, region or country at some point. The question is how to prepare for the crises and recover from it afterwards? Some of us recover better from the crisis than others and, in addition, in a shorter time. The concept of self-renewal capacity will be introduced here as a tool to prepare for the future. Two economic theories of growth: neoclassical growth theory and endogenous growth theory are used here as catching points in search of self-renewal capacity. The results show that endogenous growth theory gives more room for self-renewal capacity than neoclassical growth theory, but, still, several questions remain unsolved. Self-renewal capacity starts clearly from an individual level learning processes and grows in time to consider firms, organisations, institutes and regions. Exploitation, exploration, absorption, integration and leadership together with social capital are in core of self-renewal capacity. Together with localised technological knowledge and collective knowledge, self-renewal capacity can combine bottom-up and top-down approaches.

Keywords: Self-Renewal Capacity, Growth Theories, Regional Development, Localised Technological Knowledge, Collective Knowledge

1. INTRODUCTION

The basis in the search of a concept “self-renewal capacity” starts from the point of view that a person, organisation, region or country faces a crisis sooner or later. However, a crisis affects differently different actors: some survive better and are stronger after it, but some of the actors sink even more. This paper adopts the fact that crises simply cannot be avoided, but one can be prepared for it by developing “self-renewal capacity”, the concept to be defined later on this paper.

There is a load of literature on economic recessions and crises that emphasis the nature of strategies and development policies made for future planning. Planning the future is generally based on history and the ideal of avoiding mistakes made in the past. However, strategies and policies developed in search, and making of, the better times, don’t often evolve at the same time with the existing world.

The paper will put flesh around the bones of a concept “self-renewal capacity” by using two theoretical frameworks as platforms and catching points in search of it. The primary research question is how the two main economic theories of growth view the concept of self-renewal capacity. Is there room for the concept as such in the main (traditional) economic theories? The two theories used here are “neoclassical growth theory” and “endogenous growth theory”. By taking a closer look into these two theories, and their alternative ways in threading internal variables as sources of economic development and growth, the discussion of “self-renewal capacity” may begin.

This working paper is a part of an ongoing project “Self-Renewal Capacity of Clusters: Three Level Analysis on Resilience and Innovation Policy (Sere)” in the Research Unit for the Urban and
Regional Development Studies at the University of Tampere. The aim of the working paper is to look at the Sere-project’s approaches in a wider perspective, and to give background and deeper understanding of the economic development and growth to support the project, even if the project’s main approaches are not focused directly on economic growth.

2. THEORY NUMBER ONE: NEOCLASSICAL GROWTH THEORY

It is not far wrong to say, that the father of a modern neoclassical growth theory is Robert Solow. The idea of Solow’s (1956) was to explain economic growth by taking account also technological improvement i.e. allowing it to determine growth outside the previous, so called post-Keynesian theory, where the interventions taken by public sector (increase of public demand) were seen as the main drivers for economic growth. Starting from the classics, it has been under investigation for a long time to study why growth rates vary in different countries and what are the factors behind in building economic development. The basic assumption is that the increase of factors of production is the easiest way to gain more. Traditional factors of production are:

1) natural resources
2) physical capital and
3) labour

Natural resources contain land and other resources taken from the Mother Nature. Farmers can increase their production by farming more land up to a certain point. The short definition for physical capital is machines, buildings and equipments. However, the wider definition contains financial capital (money and stocks in a market), real capital (equipments controlled by state needed in production processes) and land and other resources (Fagerberg, 1994; Pekkarinen and Sutela, 1996; Woolcock, 2001). But the three factors of production mentioned above have been the corner stones in defining the sources of economic growth for long.

In neoclassical growth theory models the assumption is, that in the long run, with diminishing returns to capital, a country’s per capita growth rate tends to be inversely related to its initial level of income per person (Barro, 1989). In other words, it would mean that countries should convergence in time and thus, inequality between countries should reduce. However, empirical evidence does not support this assumption. According to Barro (1989), after post-war period per capita growth rates in 100 countries are uncorrelated with the starting level of per capita product. If the empirical findings do not support the assumptions of neoclassical growth theories, what could be the reasons for that?

The first thing that crosses mind is that the theory is poor or not developed enough. In neoclassical growth theories the main problems are the linear ways of thinking about world being created. If input is about to increase, it has direct impact on output. And the impact is also positive. The basic rule is more resources, more outcome. However, it is not as simple as that. There exist masses of literature saying that a process of production or alike cannot be move from one place to another just like that. And this is also the explanation why the convergence between countries, as neoclassical theories suggest, does not happen. In every case, the observed phenomenon is related to its
environment such as people, infrastructure, political atmosphere etc. One of the classic examples is that there is a bank in a small region and the bank is making good result in its financial actions. Very often the eye is on the director of the bank. In a small bank the director is phenomenal at what he is doing and he invests wisely bank’s money by letting people in their needs. If the small bank is part of a bigger consortium, the director is usually moved to a bigger bank and to a bigger region. Very often, the director of a small bank does not succeed in a bigger bank. Why is this? This is because of the director was moved from his context in a small region and he has no shared experience with new people (customers) he is supposed to interact with in a bigger region. In a small bank the director knew if it was wise to let money to a farmer whom he has known for ages and who wanted to invest in farming machines, for example. In a bigger region, there’s an absence of common history.

The second huge problem in neoclassical growth theories is that they take the relationships of factors for granted and do not allow individual decisions. Every economic agent is supposed to look for a profit maximisation and therefore all the actions taken by the actors are based on finding the best economical situation. However, this is not the case in every situation. One can study ancient languages for pure pleasure it gives for him and not because of looking profit. Or people can work for charity etc. Not all the actions are made in an economical way of thinking.

The third problem in neoclassical growth theories is the highlighted role of technological change as an exogenous factor. Especially in Solow’s formulation, technological change is part of economic growth, but it is an exogenous factor and so called “public good”. Public good means that it is available for everyone, in this case technology, and who ever can, may just start to use it. Besides the exogenous nature of technological change, Solow and neoclassics have many assumptions, such as perfect markets, perfect knowledge in the markets, utility maximisation, no spillovers and positive and reducing marginal revenue (Solow, 1956; Fagerberg, 1994; Firth and Mellor, 2000; Nelson, 1998). One could easily argue against number of these assumptions, for example, perfect markets and perfect knowledge in the markets, but such assumptions are fundamental to this mode of analysis.

The fourth, and certainly not the least, problem in neoclassical growth theories is how they threat knowledge as a factor of production. One of the factors is labour force, but knowledge, human or intellectual capital (depending on ones definition) is kind of embedded the labour factor. On the other hand, threading labour force as such, the quantity (or quality) of knowledge among labour force is not diverged anyhow. This is huge problem and will be discussed later on together with endogenous growth theory.

Solow’s neoclassical growth theory has been able to empirically explain two thirds of economic growth. His model has been widely used for decades and it still is (Yamarik, 2006). However, more recently the focus on studying economic development and growth both on a national and regional level, has been more on knowledge, knowledge spillovers and innovations.
3. **Theory Number Two: Endogenous Growth Theory**

Because Solow’s theory couldn’t explain all of the economic growth, new theories were developed. One of these is the new theory of growth, also known as endogenous growth theory, developed by Paul Romer. Romer’s (1986, 1989) main argument is that technological change is not “manna from heaven” and its rate and direction can be directed. If this is the case, technology can then be made endogenous to growth, rather than being an exogenous factor as in Solow’s model. In addition to this, human capital and investments in innovations can then be observed to be crucial in the process. The new growth theory sees knowledge as a public good (Romer, 1990; Juniper, 2002; Harris, 2001). Traditional goods are rivalrous and excludable; they are also privately produced and they can be bought on rivalrous markets. However, public good (in this case knowledge) is available for everyone. Once the technology for producing goods is presented, the technology then becomes available for others. Of course patents provide some protection to intellectual property, but after a while patents expire and this protected knowledge is available for others. In contrast, human capital is rivalrous and excludable. A person can only physically work in one place at one time. In general, new growth theory stands in stark contrast to the law of diminishing returns. That is because the law of diminishing returns suggests that productivity decreases if we increase the inputs. However, over the last 100 years, productivity in developed countries has increased. The new growth theory attributes this to innovations and knowledge spillovers.

**Education and its contribution to economic growth**

As simplicity, this paper puts human capital and knowledge together and uses concept “education” instead of separating them. Education, in this sense, will form from number of years in formal schooling or certain levels of education (e.g. primary, secondary or university level education). Education is then a proxy, which allows statistical analyses to be used. This is not an ideal way to approach human capital and knowledge, but as far the most used one. There are numerous recent empirical studies about the impact of education on economic growth. Lin (2003) found in his study on Taiwan that the contribution of education (human capital) to the economic growth between years 1965-2000 was 24.77%. Lin’s study is based on an augmented Solow model estimation using factors of production as physical capital, labour force and human capital. The average contribution of physical capital to economic growth was 15.66%, labour force 22.3% and technical progress 37.27%. Lin (2004) has also studied the role of higher education on economic growth in Taiwan by using a similar augmented Solow model. This study based on same period and using similar data in his latter study, Lin (2004) focuses on higher education and in particular, different types (disciplines) of higher education. The results of Lin’s study show that higher education overall has significant effect on Taiwan’s economic growth given the fact that one additional percent of higher education stock increases real output as a whole by 0.19%. Lin’s study also shows that engineering and natural sciences play a more crucial role in this process (one additional percent of engineering and natural sciences increases real output by 0.9%), while disciplines like humanities (-0.3%), business and social sciences (0.04%) and agricultural sciences (0.07%) have less impacts on economic growth. Humanities negative coefficient (which is not statistically significant at 10% level, but still) actually would mean that it has a reverse effect on economic growth. This, on the other hand, taken like this,
would give interesting signals to the politicians who make higher education policy! But it has to be remembered that not all impacts of education can be measured in money and therefore taken account in growth accounting as such.

Petrakis and Stamatakis (2002) studied the impact of human capital on economic growth in 24 countries. They divided countries into three categories, i.e. advanced countries (OECD), developed countries (OECD) and less developed countries (non-OECD countries). They also divided human capital into three different categories in terms of education (primary, secondary and higher education). Factors in their production function were physical capital, labour force, human capital and the average working time of employees. The study of Petrakis and Stamatakis suggests, that primary and secondary level education are more important to economic growth in less developed countries than in OECD countries. Economic growth in OECD economies depends mainly on higher education.

Asteriou and Agiomirgianakis (2001) studied economic growth in Greece between years 1960-1994 with production function analysis. The factors in the function were GDP per capita, human capital (in terms of enrolment rates to primary, secondary and higher education) and public expenditures on education relative to total public expenditures. Asteriou and Agiomirgianakis found out that co integration between GDP and education exists and primary and secondary level education are more important to economic growth than higher education.

Self and Grabowski (2004) studied the impact of education on India’s economic growth between years 1966-1996. The study was based on “Granger causality” by testing the significance of education to per capita GDP. Only primary and secondary level educations were significant in their study.

Overall, many studies of the relationship between education and economic growth have concluded that there is a strong relation between these two. However, one of the most interesting findings of these studies are that primary and secondary level education seem to be more important to economic growth than higher education in developing countries. What could be the interpretation for this sort of results? One could say that the explanation is of how to use human capital and knowledge. Human capital and knowledge by themselves don’t do anything; it is about how to use them. More advanced countries can use human capital and knowledge more effectively than less developed countries; that is because more advanced countries have more people with human capital already. Because the process is accumulating, it is important to get the basic structures in order before adding more knowledge on top of the old knowledge.

4. **DEFINING “SELF-RENEWAL CAPACITY” AND PUTTING IT INTO A MAP**

Sotarauta (2005) and Ståhle (1998) have presented a concept called self-renewal capacity. According to Sotarauta (2005), self-renewal capacity represents a set of processes that can be intentionally designed for the future on one hand, but on the other hand, adaptation is in a core. Self-renewal capacity can be seen as a set of capabilities aimed at renewing personal, organisational or even national resources. The capacity is a resource formed of a) the amount of work a system can perform, b) the power of receiving ideas and knowledge overall and c) the ability to perform or produce something to be used in preparing the future and in facing future crises.

Ståhle (1998) sees self-renewal capacity as organisation’s overall capacity to master changes in its strategies, operations and knowledge. This, on the other hand, is due to organisation’s prowess to
manage information, knowledge and innovations. Also Flier et al (2003) see renewal itself as actions to align organisational competencies, even if their study is about strategic renewal processes. However, similarities can be found. When looking at the big picture i.e. economical system in a region, the functions of self-renewal can be found from several places and not just from one. However, one way of studying self-renewal capacity is to approach the concept by using case studies, and by that, try to proceed from a micro level to a macro level.

Sotarauta (2005) has specified five functions of self-renewal capacity to be based on:
1) exploitation
2) exploration
3) absorption
4) integration and
5) leadership

**Exploitation and exploration**

By exploitation is meant the utilisation of existing information, knowledge, processes, products etc. If something has already created and is about to need, there’s no meaning to invent it again. Perhaps someone could use concept “imitating” instead of exploitation, especially when producing almost similar products than competitors.

However, after some point, the existence of exploitation is not enough anymore and one has to create something new. This is the stage where exploration steps in. Exploration is a (research) journey to somewhere where one could find something radically new or the journey may not be the most successful one. If the journey is not useful, it will be a waist of money. But, on the other hand, if it is useful, and will lead to sources of creating revolutionary ideas, then it’s definitely not waist of money. After exploration, new ideas, knowledge etc, will be exploited. As a matter of fact, exploration is followed by exploitation and vice versa. Due to this, it is not actually clear which one comes first (it is like a chicken and egg -dilemma), but at the end of the day, they both are needed. It seems obvious, that exploration is not very common among enterprises, regions etc. overall. This could be because of the financial risks or that people are happy with their present state. Now, this is the occasion in which huge danger lays. When a crisis happens, and one has not prepared to it, things may end up totally badly.

Crisis can also launch a set of processes that, in a long run, lead to an exploration. Unfortunately, when I a crisis happen, R&D funding is usually the first one to cut off. Alternatively, this could be the best opportunity to invest in R&D to get a head in future markets regarding to competitors, but only few (if none) are willing to do this.

**Absorption**

Absorptive capacity, by definition, means the ability to recognise the value of new, external information, assimilate it and apply it to commercial ends (Cohen & Levinthal, 1990). Cohen’s and Levinthal’s original definition focuses on a firm level, but can applied to other fields, such as regions and in different systems in general, as well (Antonelli, 1998; Coombs & Metcalfe, 2000; Howells, 2005). The basic idea is that a firm is never alone in the location (region etc.) where it operates.
Different kind of information and knowledge flows are coursing all the time, but successful firms know how to absorb the essential from the environment and by that, increase its absorptive capacity. Absorptive capacity is also strongly based on firm’s prior knowledge. That is because of knowledge has an accumulative nature, where new knowledge is put on top of the old without loosing it.

**Integration**

Integration can be seen as connecting oneself to networks. Networks are binds on several layers consisting of actors, organisations, enterprises, public sector, private sector etc. Integration and its relation to self-renewal capacity conceptualised like this, has a direct link to social capital. In taking a very quick dive into social capital, Robert Putnam cannot be avoided. According to Putnam (2001; 2000; 1995), but also OECD (2001), social capital, on one hand, is a value, which arises from the reciprocity of networks and the norms within. Networks and norms, on the other hand, have value for the people who operate in the networks and under the common norms. Social capital can be in a formal or non-formal shape. Social capital in a formal shape is, for example, organised organisations or associations. Non-formal social capital is, for example, pub evenings on Friday nights or card game evenings on Thursday nights. Social capital can also be lean or high density. In Putnam’s examples, the density of social capital is very high among manual workers who see each other every day in a factory. Correspondingly, social capital is lean for example then, when two, not too well knowing people, meet at the supermarket: they just nod and carry on without changing talks.

When looking at the sources of social capital, three main fountains can be recognised. The first one is family. Within a family, norms and ties (bonds) are the strongest. In a family, children are raised under parent’s norms and their way of living (how to comprehend world as it is) and this, naturally, reflects directly to the children. Based on the social relationships in the family, external social contacts to other people outside the family are created. The next fountain of social capital is relationships outside the family. These connections can be called “bridges”. Places were bridges can be created are, for example, schools, working places and other forums where people meet. The last fountain of social capital is relationships between groups and organisations. These sort of connections can be called “links”. One could see links as language skills in a society. (OECD, 2001; Woolcock, 2001; Coleman, 1988; Painter & Levine, 1999, Raivola, 2003.)

It seems obvious, that more tight and reliable connections to actors in a network, gives more fruitful platform to develop self-renewal capacity. This also has links to strategy processes in a region, for example, but it is not worthwhile to get deep in to it at this stage.

**Leadership**

Even if self-renewal processes can be extremely personal (but collective, for example, at a regional level) self-renewal capacity needs a proper leadership. As Sotarauta (2005) states, without leadership, self-renewal capacity may remain static and turn out to be a hollow shell. Leadership is then a collective power that drives forward exploitation, exploration, integration and absorption. It’s more directing the ship than controlling it. However, a proper leadership is not an easy task to do. Sotarauta,
Hukkinen, Bruun and Linnamaa (2002) have analysed the basic tasks of leadership into following five categories:

1) strategic and visionary leadership
2) network leadership
3) resource management
4) knowledge management and
5) institutional management

Strategic and visionary leadership is about the ability to define strategies and visions for development together with actors. It is also about the ability to bring visions of different scenarios of futures together and transform them into focused strategies and actions. Network leadership is about the ability to involve people and empower them to act as a network for joint, but also separate goals. Resource management is about the ability to utilise existing resources and to find new ones in the promotion of development. Resource management also requires the ability to direct resources according to existing strategies. Knowledge management is about the ability to create an environment that supports knowledge management in different organisations i.e. it is an ability to openly grasp initiatives by informal decision making channels and make them concrete in formal structures of decision making. The last basic task of leadership is institutional management. By institutional management it is meant the ability to create and maintain flexible, but at the same time persistent, institutional set-up that supports networking and the fluidity of development processes.

5. Localised Technological Knowledge and Collective Knowledge

It seems crystal clear, that there exists an essential gap when mapping self-renewal capacity only by using neoclassical growth theory and endogenous growth theory as catching point theories. Institutional theories must be taken account when developing the theoretical framework more precisely (e.g. Hodgson, 2006). Concepts like technological knowledge and its generation by collective processes developed by Christiano Antonelli (2005; 2006), seems to provide good approaches in future mapping of self-renewal capacity.

Antonelli (2005; 2006) sees that collective knowledge in localised processes is a main driver together with exploiting external knowledge (after exploration) in creating new technological knowledge. Internal and external knowledge are complementary inputs, but external knowledge gives new insights into generating new knowledge. Technological knowledge, by definition, is an outcome of localised interactions by a variety of heterogeneous agents that are able to learn and to establish network relations rooted in a limited technical and product space. In these spaces each agent has accumulated competence by means of a process of learning by doing. Following the Schumpeterian tradition, where firms are seen in the core of introducing new innovations, market failures or mismatches are incentives for firms to develop new technological knowledge and by the end, new technological innovations.

In generating new technological knowledge, the variety of agents is important as well as their absorptive capacity. Among the agents, proximity makes the flows of knowledge easier to grasp and therefore exploit knowledge more effectively. However, according to Antonelli (2005; 2006), very
often knowledge in the region is dispersed and fragmented, scattered among myriad of learning agents. As a result of this, coordination of the agents is needed, since no single agent can be alert of every movements of knowledge, especially external knowledge, in the system he operates.

Collective processes, and thus collective knowledge, makes the mapping of self-renewal capacity more concrete, since learning and sharing information are, by no doubt, in core of the concept self-renewal capacity. Collective knowledge is a shared activity, because of the continual efforts of acquisition and implementation it requires (Antonelli, 2005).

6. DISCUSSION

It seems natural that, endogenous growth theory gives more room for self-renewal capacity than the neoclassical growth theory. The world for neoclassics is linear and factors of production are threaded as stocks. Individual capabilities and decision making is neglected and, according to neoclassics, disequilibrium between countries’ economical performance will vanish in a long run (convergence hypothesis). However, as described earlier in this paper, it doesn’t seem to be the case. This will lead us to the consideration where sources of growth rely hugely on skills, human capital and all sort of self-developing. Technological improvement is not “manna from heaven”, but as a consequence of human actions and the use of knowledge. Macro level theories don’t seem to give exact answers at this point how self-renewal capacity can be developed.

Localised technological knowledge and collective knowledge can be used here as missing concepts in filling the space left from the neoclassical and endogenous growth theories when coming from top-down. Concepts above bind self-renewal capacity are more adequate to networks, organisations and institutes. But, after all, it looks more likely that, the starting point of self-renewal capacity relies heavily on learning and individual level processes, and, from where, it can be developed to contain larger parts such as firms, organisations, institutes and regions. So in this sense, approach from bottom-up is needed. After the path of evolution emerged, self-renewal capacity can be considered seriously as a factor of production.

All the five functions of self-renewal capacity (exploitation, exploration, absorption, integration and leadership) addressed by Sotarauta (2005) seem to be crucial when looking at the touching points in developing the capacity. Exploitation of existing resources, as well as radical search of new modes of action, is well understood. Knowledge has an accumulating nature and, thus, new knowledge is on the previous one. Absorption is needed, since, for example, a single person cannot change the whole system even if he would like to do it. Integration is important, because human being is a social actor and not operating in a vacuum. In addition to this, the importance of social capital is relevant. This is because of one has to develop himself in relation to others. If people around are untrustworthy and not willing to cooperate in a good will, firm, organisational, regional etc. self-renewal capacity is difficult, or even impossible, to develop. At organisational and regional level, good leadership is needed to guide the system as a whole and to utilise it in a most effecting way.
7. **Conclusions**

In the search of self-renewal capacity, by using two different theories of economic growth, neoclassical and endogenous, it can be said, that these two theories gave some answers, but a huge set of them still remain hidden. Obviously, endogenous growth theory gives more room for self-renewal capacity, but the unexpected nature of economic development at a regional and country level should be studied more by using different theories and approaches. An evolutionary approach is one of those to be mentioned and to be used in future studies.

As a summary, it can be said that, self-renewal capacity starts from an individual level learning processes and grows in time to consider firms, organisations, institutes and regions. Localised technological knowledge and collective learning are in core in building self-renewal capacity through individual learning processes. Concepts like these can also be seen as a junction of combining individual level (bottom-up) and wider level (top-down) approaches together. When facing the future crises, the ones who have wider capacity of self-renewal, may recover from the crisis better. Developing a self-renewal capacity is a sum of different actions to be taken, and to be considered together.

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**References**


